The Builder.

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The New London Building Act.—II.

THE first point we come to under the head of "Construction" is the the reference to the first schedule appended to the Act, in regard to the structure and thickness of walls, which replaces the "First Schedule" of the Act of 1855. The preliminary clauses are prefaced with a new sentence pointing out specially that the provisions in Parts I. and II. (the principal portions) of the schedule apply to walls built of bricks not of less than ("of not less than," it should have been) 8½ in. long or of stone or other blocks of hard and incombustible substance the beds or courses being horizontal." In regard to the size of the brick it is important to observe that while the minimum length of 8½ in. prescribed in the Act of 1855, is retained, the limitation "not more than 9½ in." has been dropped. This sentence is not numbered with the other clauses, and the clause numbered "I." in the preliminary matter is to the same effect as No. I. in the 1855 Act, with the addition of the words "unless otherwise sanctioned," and of a sentence to the effect that open sheds not more than 16 ft. high and not exceeding four squares in area may be constructed of any substances and in any manner approved by the District Surveyor. But what is an "open shed"? We apprehend that there will be differences of interpretation claimed on that phrase. Clause 2 contains the same provisions as the 1855 clause, except that the provision that "no part of the wall shall overhang any part underneath it" is relaxed to the extent of allowing the wall to overhang six inches if solidly corbelled out, and provided that the other side of the wall be carried up vertically. The present Clause 3 is faulty and redundant in wording. Instead of merely saying, as in the 1855 clause, that every stone wall in which the beds of masonry are not laid horizontally shall be one-third thicker than the thickness prescribed for stone walls in the schedule (*i.e.*, rubble or random walls must be one-third thicker than coursed walls), the new clause reads:—

"3. The thickness of every wall not being built of bricks or stone or other hard and incombustible substances laid in horizontal beds or courses shall be one-third greater than the thickness prescribed in Parts I. and II. of this Schedule."

Why bricks are dragged in, seeing that it is impossible to build with bricks otherwise than in horizontal courses, one cannot see, the more so as the marginal heading gives it "extra thickness of certain stone walls." If that is what it means, the old clause was far more simple and intelligible. And the confusion of meaning is certainly not reduced by the next clause:—

"4. The thickness of any wall of a dwelling-house if built of materials other than those before specified shall be deemed to be sufficient if made of the thickness required by Parts I. and II. of this Schedule or of such thickness as may be approved by the Council."

This is as near as possible to a contradiction in terms. The general (new) preliminary clause states that the provisions of the schedule apply to walls of brick or stone with horizontal courses. Clause 3 tells us that "*every* wall" built otherwise than so described shall be one-third thicker than the schedule thicknesses. Clause 4 states that walls of dwelling-houses built otherwise than according to the specification in the first clause shall be deemed sufficient if made of the schedule thicknesses, "*or* of such thickness as shall be approved by the Council." What is to be the legal force of that "or?" By the wording of Clause 4 the building owner or his architect can certainly claim that the schedule thicknesses are sufficient for any materials. The words distinctly convey that meaning. Take the case of concrete walls, for instance. It is evident to any one who understands English that according to Clause 3 concrete walls must be one-third thicker than brick or stone walls, in any building. According to Clause 4 they may in dwelling-houses be of the same thickness as brick or stone walls. (By the existing law concrete walls are to be at least as thick as brick ones of the same extent.) The framers of the Act may have known what they meant, but they have certainly not known how to express it intelligibly. It may be admitted that the existing law is almost equally confused in expression on these points, but the opportunity should have been taken to remedy this confusion of expression, instead of intensifying it.

Clause 5 of the schedule is a new provision (much required) in regard to hollow walls, viz.: That there shall be a wall on one side of the hollow space of the full thickness prescribed by the Act. Clause 6 provides for the measurement of stories as in the present Act, except for the difference (already noticed) that a story shall be measured from the underside of its floor joists to the underside of those of the story above it, instead of measuring it, as at present, exclusive of the thickness of the floors; the height limit of a "topmost story" is fixed as at present. The present Clause 6, in regard to the height of external and party-walls, is improved (7) in precision of language, and it is important to note that after the words "to the top of the topmost storey" is added the condition "whether the wall is carried to the full height or not." Clause 8, as to estimate of length of walls, is identical with Clause 7 of 1855. Clause 9 (the present Clause 8) as to footings of walls is identical in effect, with the rather absurd addition "unless an adjoining wall interferes in which case the projection" (of footings) "may be omitted where that wall adjoins." How could it be otherwise? A special phrase excludes walls on bressummers from the requirement as to footings; this is necessary, since the "base" of a wall on a bressummer is now defined in the same terms as the base of a wall on the ground.

Two new preliminary clauses, 10 and 11, are added, the first prescribing the method of underpinning, with brick or stone in cement to the full thickness of the old wall, and resting on solid ground or concrete or other solid substructure to the satisfaction of the District Surveyor; the second forbidding the thickening of the wall without notice to the District Surveyor, and prescribing cement and proper bonding.

We now come to the real pith of the schedule—the actual thicknesses required; but it is to be noticed first that while the existing schedule deals first with "Dwelling-houses," and afterwards gives a clause providing that all buildings which are not in either the "Public Buildings" or "Warehouse" classes shall be treated as "Domestic buildings," the new schedule ignores the expression "domestic buildings" altogether, and includes them under the general heading of "Buildings not Public, and not of the Warehouse class." The regulations are not given in the convenient and easily-read form of a table, but are written out at large (not at all an improvement from the architect's and surveyor's point of view), and the order of classification is inverted, the table commencing with the smaller walls instead of with the larger ones, as at present. In comparing the new schedule with the old we must therefore begin at the end of the latter, and work backwards (taking the "Dwelling Houses"

schedule first). The result is as follows, as shortly as we can give it:—

1. A wall not exceeding 25 ft. in height is under the same rules as at present unless (when under 30 ft. in length) it comprises more than two stories, when it must be 13 in. thick below the topmost story. In the case of a story in the roof this may, of course, mean all except about 4 ft. 6 in. of the upper part of the height. The change is a salutary one, and a bugbear to the jerry-builder. In the case of "length unlimited" the rule is as at present.

2. A wall between 25 and 40 ft. in height (the present 30 ft. division is omitted) and not exceeding 35 in length, must be 13 in. thick "below the topmost storey" instead of below the *two* topmost stories as at present, and for "length unlimited" it is the same as the present rule for a 40-ft. wall.

3. A wall 40 ft. to 50 ft. high, not exceeding 30 ft. in length, must be as a wall of the same height but 45 ft. in length under the present law. For "length unlimited" it is the same as under the present law.

4. A wall from 50 ft. to 60 ft. high must be, if 45 ft. long, the same thicknesses as required for 50 ft. long in the present law; for "length unlimited" it is the same as under the present law.*

5. A wall from 60 ft. to 70 ft. high, 45 ft. long, is the same as a wall 55 ft. long under the present law; for "length unlimited" it is to be increased in thickness by 4½ in. for every story below the uppermost two stories. In the majority of cases this would come to the same as the present law. This is qualified, however, by a parenthesis—"subject to the provision in this schedule respecting distribution in piers." This is a detailed application of the existing general rule (1855) that "the additional thickness may be confined to piers properly distributed of which the collective widths amount to one-fourth part of the length of the wall."

6. A wall from 70 ft. to 80 ft. high and not exceeding 45 ft. in length is the same as within 40 ft. in length under existing law, except that the 17½ in. wall is to be carried through three instead of two stories. For "length unlimited" it is to be increased in thickness 4½ in. in each story below the uppermost two; again practically the same as the existing law. The provision as to "distribution of piers" applies again to this clause as well as to the following clauses 7, 8, and 9.

7. A wall from 80 ft. to 90 ft. high not exceeding 45 ft. long must be 26 in. thick for the lowest story, 21½ in. for the next, 17½ in. for the next three, and 13 in. for the remainder. For "length unlimited" 4½ in. to be added to each story below the uppermost two. For the shorter length this demands more material than the present law, for the unlimited length rather less, the 26 in. being for one story only instead of two.

8. A wall from 90 ft. to 100 ft. high, not exceeding 45 ft. in length, is nearly the same as one up to 80 ft. long under the present law, except that the 26 in. thickness is only for one story, instead of two. For unlimited length it is increased 4½ in. to every story below the two top ones. This is a rather heavier wall than under the existing law, as the 21½-in. wall runs through three stories instead of two.

9. A wall from 100 ft. to 120 ft. high (the existing law deals with nothing above 100 ft.), and not exceeding 45 ft. in length, commences at 30 in. thick for the lowest story, and the remainder in much the same proportions as before; for unlimited length all stories except the upper two being increased by 4½ in.

The existing provision, that when a story exceeds in height sixteen times the thickness of wall prescribed, the wall shall be increased to a thickness of one-sixteenth the height of the story, is retained, but with the additional condition that the thickness of each external and party-wall below that story shall be increased to the same extent.

The existing "qualification in case of certain walls"—viz.: that if any external or party-wall is not more than 25 ft. distant (centre to centre), from another external or party-wall to which it is tied by the beams of any floor, "the length of such wall is not to be taken into consideration"—is abrogated, and does not appear in the new Act.

In the schedule for "warehouse walls" the conditions for walls 25 ft. and 30 ft. in height are the same as at present. For 40 ft. in height the thickness of base for 30 ft. in length is extended to 35 ft., while that for 60 ft. in length is restricted to 45 ft., unlimited length remaining the same as at present. For a wall 50 ft. high, the 17½ in. thickness at the base is restricted to 30 ft. in length; the 21½ in. thickness to 45 ft. (it is at present 70 ft.); unlimited length as at present. For a wall 60 ft. high the present 17½ in. is not allowed at all; it must be 21½ in. at the base up to 45 ft. in length (present law 50 ft.); unlimited length as at present. A wall 70 ft. high* also is not to be less than 21½ in. at the base, up to the length of 45 ft., the 17½ in. thickness for 30 ft. length being abolished; over 45 ft. long it is to be increased 4½ in. up to within 16 ft. of the top of the wall. This exclusion of the highest 16 ft. of the wall from the necessary extra thickness is the same provision as is now made in general terms in the 5th explanatory clause of the 1855 Act as to "warehouse" buildings, only in the new Act it is repeated for each height scheduled. A wall 80 ft. high remains as at present up to 45 ft. in length, above that length the same provision for 4½ in. thickening follows in the same terms as in the last case. Walls of 90 ft. and 100 ft. height are treated on the same principle, the prescribed thickness at the base for limited lengths being as at present, only that the lengths are reduced to 45 ft. in each case, in place of the 60 ft. and 55 ft. respectively of the present law, while the intermediate length of 70 ft. disappears from the schedule. For a wall 120 ft. high the thickness is to be 31 in., at the base up to a length of 45 ft., and beyond that length the extra 4½ in. is applied as before, to within 16 ft. from the top of the wall. Between the heights of 70 ft. and 120 ft. the arrangement is subject to the same provision as to "distribution in piers" as in the case of the other classes of buildings. The explanatory clause as to the method of interpreting the instructions about thickness of warehouse walls (No. 11 in the new Act, No. 5 in the 1855 Act) is the same in effect though improved in wording, with the exception that the permission that in walls of not more than 30 ft. high the upper story wall may be 8½ in. thick is modified by the words "provided that storey does not exceed 10 ft. in height."

The provision as to walls which are less than a fourteenth part of the height of the story, remains as in the 1855 Act, with the provision that "each external wall and party wall below that storey shall be increased to a like extent," as in the parallel clause in regard to buildings not in the warehouse class.

Some explanatory clauses, labelled "Miscellaneous," occur at the close of the schedule as to warehouses. The first of these is a repetition of the "Miscellaneous" clause of the 1885 Act in regard to "cross walls," but with the modification that instead of the phrase "unless it is carried up to two-thirds the height of the external or party walls," we have "unless it is carried up to the floor of the topmost storey." The succeeding provision as to the extent of openings and recesses in a cross wall is the same in effect as at present, only more precisely worded.

A second clause, under "Miscellaneous," provides that "wherever a cross wall becomes in any part an external wall" it shall be treated as such in regard to thickness. This is, perhaps, desirable in an explanatory sense, though the requirement it makes is legally covered by the definition of "external wall." A third explanatory clause under "miscellaneous" applies the permission as to distribution in piers generally to all cases of walls requiring to be thickened up to one $\frac{1}{16}$ in. or $\frac{1}{12}$ the height of a story, in the two classes of buildings respectively.

It will be seen that the existing law as to thicknesses of walls for various heights has not been very seriously modified, but that nearly all the modifications are in the direction of increased solidity. Many builders and building owners will grumble at this, no doubt, but we do not think any architects will.

But we cannot imagine why the convenient form of the old schedule, in which the respective thicknesses and requirements could be read at a glance, should have been departed from to put these multifarious requirements in the form of long written-out sentences, from which it is so much more difficult to extract the meaning.

Returning from the schedule to the body of Part VI., we find in Clause 54 the rule for recesses and openings in external walls the same as at present, except that in limiting the area of such recesses and openings the words "above the ground storey" are added—the area of such recesses and openings, taken together, above the ground story is not to exceed half the area of the wall above the ground story. (It will be observed that "recesses" and "openings" are now treated together, instead of being treated in almost identical words in separate clauses, which is a desirable simplification.) We presume that the words "above the ground storey" are intended to avoid a special legislation for shop-windows and other such cases; but it must be observed that the wording of the clause, though we may very well guess what it means, does not properly explain itself, and that any one reading the Act by its own light only might very well come to the conclusion that ground stories were forbidden to have any opening. This is a slipshod and careless piece of wording. For recesses in party-walls the provision is the same in the main as at present; the differences are that when the recess is arched over the arch shall be "not less than two rings of brickwork the full depth of the recess;" that recesses formed for lifts are (necessarily) excepted from the condition of being arched over; that if a recess is less than 5 in. in depth "corbelling in brick or stone may be substituted for the arching;" and that such recesses are not to come within 13½ in. (instead of "one foot") of the inner face of the external walls. The Superintending Architect (on application) may consent in writing to a modification of the provisions as to recesses and openings in any special case where he may think proper. With this we may take the clause (60) relating to "Chases in Party Walls," which is the same as at present, with the addition that no chase shall be made "within 13 in. from an external wall." Does this mean, as in the case of recesses, from the inner face of the external wall? If so, it should have been so stated; there is room for question as to the reading; and (though the matter is unimportant in itself) it may be observed that the "recesses" clause says "13 in." while the "chases" clause says "13½ in." To find two sentences which are apparently intended to have the same meaning printed with two differences of expression on nearly consecutive pages shows very careless editing. The additional sentence to the effect that "no chase shall be made in a wall of less thickness than 13 in." is only necessary as an explanation for dull intellects, as the provision is covered by the other terms of the clause. What is not made equally clear is that the making of recesses or chases on one side of a party-wall must be carried out with due reference to the position of any that may be on the other side of the same wall, in order to preserve the prescribed thickness at the back of every part of the

* The new Act does not use the phrase "length unlimited," but only "exceeding so many feet in length"; but the effect is the same.

* We put it so for brevity; of course, each height means, as at present, any height between that and the next lowest height scheduled

chase or recess. The terms of the Act cover this, but it may not be obvious to the duller apprehension, which is in fact led astray by the direct provision that a chase may not be formed "within a distance of 7 ft. from any other chase on the same side of the wall," as if (by implication) the relative position of those on the other side of the wall were of no consequence; whereas in a party-wall of not more than 13 in. thick it would be of every consequence. Those who have had experience of the *un*-intelligence of many builders in the interpretation of building regulations will know that such an explanation would not be superfluous.

Clause 55, ("timber in external walls") shows the important modification that "loop-hole frames *and frames of doors and windows*" (the italics of course are ours) "may be fixed flush with the face of any external wall.'* This is a very important concession to the taste for flush window-frames which the Queen Anne revival has brought in. There is also a further paragraph for exempting from the provision of this clause, "by by-law or otherwise," oak, teak, or other wood, provided the work be constructed to the satisfaction of the District Surveyor.

Clause 56, as to bressummers, is in the main identical with the present provisions as to timber bressummers, with two additions: the District Surveyor may have power to require that a bressummer shall have such additional story-posts, iron columns, stanchions, or brick or stone piers or corbels, as he shall consider necessary to carry the superstructure; and that "the end of any timber not permitted to be placed in a party-wall" (*i.e.* where the party-wall is not thick enough according to the conditions of bearing on party-walls) "may be carried on a corbel or templet of stone or iron or vitrified stone-ware tailed into the wall a distance of at least 8½ in. or otherwise supported to the satisfaction of the district surveyor." Provision is also made that any metallic bressummer is to have a specified space for expansion (¼ in. to every 10 ft., or fractional part of 10 ft.). In our opinion, the bearing on the walls ought to have been increased in proportion to the length of the bressummer (wood or metal), instead of being placed at 4 in. for any length—a very insufficient bearing for a long beam.

A new clause (58) provides that any portion of a wall which acts as a party wall, or any wall already built which becomes (through alteration in the contiguous buildings, we presume) a party-wall in any portion of it, shall be deemed a party-wall "for such part of its length as is so used."

The provision as to carrying party-walls above the roof (Clause 59) is modified in detail so as to apply differently in the respective cases of a warehouse and "any other building." In a warehouse building the wall must be carried up above the roof the full thickness of the top-most story of such wall, and in any other building the thickness of 8½ in.; in a warehouse exceeding 30 ft. in height it is to be carried up at least 3 ft., and in any other building 15 in. in height measured at right angles to the slope of the roof, &c. (as at present). The regulation as to carrying up party-walls in proximity to turrets, domes, &c., remains as at present. This clause was strongly opposed by a committee of architects on purely architectural grounds, as spoiling the appearance of buildings; and we must say that in regard to semi-detached houses of a superior class and designed as one block we do think it an unnecessary demand, and at the same time calculated often to be a serious injury to a design. But in the case of ordinary street houses built in a continuous line we think the opposition to it was unwise, and that it is certainly an additional safeguard against the spread of fire, nor can we see its architectural injury in that case. It serves to break the long monotonous line of roofs, and moreover it affords the chimney-stacks a visible structural basis, instead of making them appear to stand on the slates.

The rules as to the construction of roofs (Clause 61) stand as at present, except that among the surfaces that need not be covered with incombustible materials are included "wooden cornices and barge-boards to dormers, not exceeding 12 in. in depth" (another sign of the influence of changes in architectural taste). A sub-clause is added that every window above 30 ft. in height used wholly or in part as a dwelling-house or factory and having a parapet shall be provided with means of access to the roof by dormer window, door, trap-door, or otherwise. The inclination of the surface of the roof remains the same as now for warehouses, but a new clause is added for other buildings limiting the angle of the roof upwards to 75 deg. with the horizon (excepting, as before, towers and spires). This will not fall in well with architectural effect in some styles of design, and will hamper architects sometimes in rather a vexatious manner.

Clause 62 makes the important new provision that not more than two stories shall be constructed in the roof of any domestic building, and that any such story in the roof which is at a height above 60 ft. from the ground level shall be constructed of fire-resisting materials throughout; and Clause 63 requires that every new building shall be provided, on the stories exceeding 60 ft. in height from the street level, with such means of escape in case of fire "as can reasonably be required under the circumstances," and no such stories shall be occupied until the Council have certified that this provision has been complied with.

The main provisions as to the building of chimneys (Clause 64) remain, with the addition that they may be built on iron girders with direct bearings on party or cross-walls to the satisfaction of the District Surveyor. Flues not having proper soot doors may not be inclined "at a less angle than 45 deg. to the horizon, and every angle shall be properly rounded." This phrase appears to take the place of the present awkward one, "an obtuseness of not less than 130 deg." Another new provision is that soot-doors shall be "at least 15 in. from any woodwork."

The provision as to arching over chimney-openings stands as at present; there ought to have been an amendment by the introduction of the word "straight" in relation to the iron bar to be introduced as a tie; it is often made in the curve of the arch, which is no tie at all.

The clause under notice (64) is a very long one, including a great many sub-clauses as to flues. The first three we have already dealt with. No 4 is a new regulation, that a flue shall not be adapted to or used for any new oven, furnace, cockle, steam-boiler, or close fire used for any purpose of trade or business or for the range or cooking apparatus of a hotel or eating-house unless the flue is surrounded by brickwork at least 8½ in. thick from the floor on which the range, &c., stands to the ceiling of the room next above. The next paragraph (5), is also new and provides that a flue shall not be used for a steam-boiler or hot-air engine unless the flue is at least 20 ft. in height from the level of the floor on which such engine is placed.

The clause as to lining of flues is altered (6) to the effect that not only the inside of every flue but also "the outside where passing through any floor or roof or behind or against any woodwork" shall be "rendered pargetted or lined with fire-resisting piping of stone-ware" (in place of the present expression "fire-proof piping").

The next paragraph provides that the position and course of every flue shall be distinguished on the outside of the work as it is carried up "by outline marks in some durable manner," unless in the case of an external wall not likely to be built against. (There seems too much room for question as to what constitutes a "durable manner.")

The present clause as to the thickness of the back of a chimney-breast, which allows 4½ in. where it is not in a party-wall, is modified by the omission of this (which would be contradicted by Clause 54), the paragraph applying only to fireplaces in party-walls, with the same prescribed thickness as at present.

The highest six courses of every chimney-stack or shaft are now (13) to be built in cement.

The rule for the hearth-slab before fireplaces is now altered (15) from "at least 6 in. longer on each side than the width of the opening" to "at least 12 in. longer"—a very desirable modification. The rule as to the bedding of hearths adds to the present requirement, for upper floors, the words (16) "or other incombustible materials," and on the ground floor the direction, "on concrete covering the site or on solid materials placed on such concrete," is substituted for the present words "on the solid ground"; also an improvement. A further alteration is that the hearth or slab of every chimney, together with its bedding, "shall be solid for a thickness of 6 in. beneath the upper surface of the hearth" (17), in place of the existing 7 in. In regard to flues against party structures the present regulation is improved and made more decisive in wording, requiring that the flue shall be "surrounded with new brickwork at least 4 in. in thickness properly bonded" (18).

In the regulations as to timber or woodwork near flues the provision that no woodwork may go under a chimney-opening "within 18 in. of the upper surface of the hearth" is altered to "within 10 in." (21 *b*).

The "general rules" governing applications for the erection of chimney-shafts are now incorporated in the Act (Clause 65) in altered and more detailed form. The rules for width of base, extent of batter, thickness of brickwork at top, increase of thickness downwards, and use of fire-brick in the structure, are in effect as at present. The projection of the cornice of the chimney is not specially limited, but it is provided that "every cap, cornice, pedestal, plinth, string-course, or other variation from plain brickwork shall be provided as additional to the thickness of brickwork required under this Act, and every cap shall be constructed and secured to the satisfaction of the District Surveyor." This is a very unsatisfactory sentence in wording, however good in intention, as it demands the impossible. How can a string-course or plinth be fixed as "additional to the thickness of brickwork required"? It *must* go sufficiently into the wall to be properly bedded: the clause is absurd. It is somewhat an anomaly, too, that the Act should have restricted (as we shall see) the projection of cornices in public buildings of an architectural character, but does not restrict the projection of chimney-shaft cornices, which are less important architecturally and the security of which is perhaps even more important constructionally. Altogether this is a very ill-considered paragraph. The provision (4) that the foundation of the shaft shall always be made "to the satisfaction of the District Surveyor on concrete or other sufficient foundation" is an addition, and a very wise and necessary one, and so is the following one (5) prescribing that "the footings shall spread all round the base by regular offsets to a projection equal to the thickness of the enclosing brickwork at the base of the shaft, and the space enclosed by the footings shall be filled in solid as the work progresses." These regulations are well calculated to diminish the risk of settling in tall chimneys. It may be presumed that the opening sentence of the first paragraph, that "every shaft shall be carried up throughout in brickwork and mortar of the best quality," is considered to render unnecessary the direct prohibition against the use of fire-brick in the constructional portion of a chimney-shaft.

Clause 66 embodies the "rules as to close

* By an oversight in editing, some words of the existing clause are retained which have a contrary sense, though evidently not intended to be read so.

fires and pipes for conveying vapour," &c. The alterations from the existing rules are these: the rule as to the floor under any oven or stove contains the excepting sentence "which is not heated by gas," and the thickness of the incombustible material of the floor is now fixed at "not less than 6 in." The other provisions are the same as at present, only that instead of the defining words "under pressure" in regard to hot-water pipes, which are omitted, there is a separate clause exempting pipes conveying steam or hot water "at low pressure" from the restrictions as to position, and hot water or steam pipes are specially defined to be at low pressure "when provided with a free blow-off."

It is impossible to deal with the whole of the "construction" provisions in one article, and as the clause just mentioned concludes the provisions as to chimneys, fires, and heating apparatus we may break off here, and consider the rest of this important portion of the Act next week.

NOTES.

THE preliminary report of the excavations undertaken during the present year at Hissarlik, the site of ancient Troy, under the direction of Professor Dörpfeld, is published in the *Reichsanzeiger*, the Berlin official gazette, and is the first intimation of the result of this year's work.* Operations were directed almost entirely to the opening up of the sixth layer, according to the Dörpfeld classification, and the greater part of the fortified wall of the Acropolis has been laid bare. Two gateways have been discovered, on the east and south-west respectively, and the north-eastern gateway and tower, discovered last year, laid bare; the large dimensions of the latter are now explained by the fact that it contained the chief spring and cistern of the fortress. Within the walls a large number of buildings have been laid bare, as well as a quantity of store-rooms containing various ceramic objects bearing traces of "Mycenæan" culture. The investigation of the tumuli of the heroes, which, from pottery discovered, should be coeval with the city of the sixth layer, has unfortunately had to be abandoned owing to the non-arrival of the necessary "firman."

AN exceedingly interesting experiment in the revival of the Greek drama is promised for London next year. This is the performance, in English translation, of the trilogy of Æschylus, consisting of the *Agamemnon*, *Coephori*, and *Eumenides*. Incidental music for the two former plays is to be composed by Professor Villiers Stanford, who composed the music for the performance of the *Eumenides* at Cambridge, and who will conduct the whole. In order to carry out the work with archæological accuracy, a guarantee fund of 2,000*l.* is desired, though it is not expected that the subscribers will be called upon, and a deposit of 500*l.* is required to provide against the preliminary working expenses, as it is proposed to carry out the undertaking "in a manner worthy of one of the greatest masterpieces of Greek genius." The net proceeds will be handed over to the British School of Archæology at Athens, which is under the disadvantage of receiving no subsidy from Government, while the German, French, and American schools at Athens are all subsidised by their respective Governments. Although in one sense the effect of a translation will be inferior to that of a production in the original Greek, it is hoped that it will appeal to a much wider interest, this being the first attempt to bring the performance of Greek drama within reach of the general public in this country. It seems not improbable that such a scheme may prove a great success. The Honorary Secretary is the Vicountess Maidstone (Herstmonceux Place, Hailsham, Sussex) with whom all who are desirous to subscribe or assist are invited to communicate. In the allotment of tickets preference will be given to the guarantors. We are not yet told who will undertake the designing of the architectural accessories and costumes, which is even more important than the music; but considering that the scheme is in the hands of those who are seriously interested in Greek art, we may hope that these details also will receive competent attention.

* The cost of the excavations up to 1,500*l.* was borne by the German Government at the instigation of the Emperor.

CURIOUSLY enough the *Times* on Tuesday last printed two communications on the subject of Roman remains in England. In the one case Mr. Kenward, F.S.A., urged the propriety of continuing the excavations at Uriconium — that is, Wroxeter—Salop. In 1859 some systematic attempts were begun to excavate on this important site, but they have been allowed to collapse, and this important work is now practically at a standstill. It is, in truth, a national disgrace that such remains as those at Uriconium are not investigated by means of public funds. They are ancient monuments of rarity and importance, and in almost any other country they would be carefully studied, and excavations made at the public expense. Thus in Germany the Roman Camps in the Taunus are being continually cleared of the soil of centuries and their form made plain, and they are adding to our knowledge of Roman methods of defence. In the other case, Dr. Thompson, vicar of Cardiff, tells of the discovery of a Roman villa near that town and asks for funds to continue the excavations. There are many well-to-do men in Cardiff, and there is plenty of public spirit in Wales, and we have little fear that this work will not be well supported. Probably the best chance for the permanent preservation of Uriconium and for the continuance of the explorations there would be for the work to be taken up by the Society of Antiquaries. They are in a position to carry on such work more effectually than any other body of men, and we hope they will see their way to take it in hand.

A CORRESPONDENT writes to us that as we have condemned the hideous advertisements by the side of railways in England he thinks we may like to know that in Belgium things are as bad, for advertisements are plastered on to works of architectural interest. He instances the Porte de Gand at Bruges, on viewing which the eye is struck by an advertisement of Singer's Sewing Machines. We entirely agree that to allow advertisements to be affixed to what are really ancient monuments is an act of vandalism; but both in Bruges and in other towns notices may be seen stuck all about the walls of churches and other buildings so as absolutely to disfigure them. But the citizens of Bruges are sinners in other respects: the town is full of disgusting stenches; the sides of the streets contain domestic waste water, and the centre is filthy in the extreme—full of mud and refuse; to say nothing about the state of the pavement of the road, which is full of holes, and most uneven. In fact, we have no hesitation in saying that, to judge from outward appearances, the sanitary state of Bruges is very bad, and it is not a place to be visited by English in hot weather.

THE *Times* of Saturday last contained the following significant letter in regard to London water supply, dated from Nash Mills, Hemel Hempstead, and signed "John Evans":—

"In September, 1893, appeared the report of the Royal Commission on the Water Supply of the Metropolis, in which, among other things, was recommended the abstraction of 22½ million gallons of water daily from the valley of the Lea, in addition to the 72 million gallons daily at that time obtained from that source.

In September, 1894, circumstances remaining the same or nearly so, with the exception of the rainfall, the directors of the East London Waterworks, in consequence of the diminution in the water of the Lea, and in order to economise to the extent of 10,000,000 gallons of water daily, are compelled to cut off the supply to their mains at night.

No more practical testimony to the real value of the report of the Commissioners can be imagined. Not a word of comment is necessary."

We are glad to give further circulation to Sir John Evans's letter, to which no attempt at a reply has appeared, and which goes to bear out the opinion which we have expressed all along as to the real value of the much-vaunted Royal Commission on London Water Supply, the whole tendency of which has been to bolster up the companies trading in water, and to persuade the London public to be content with a stop-gap policy, instead of demanding a scheme for really adequate supply. Further confirmation of this unpleasant truth will no doubt be forthcoming as time goes on.

THE opening for traffic of the Muhlendamm locks on the 24th ult. marks the conclusion of the works on the canalization of the upper Spree, which have occupied the State and the City of Berlin for the last thirteen years. Communication for large vessels between the Elbe and the Oder is now established, and its importance will be realised yet more on the completion of the canalizing of the Oder through Breslau, thus connecting the Upper Silesian coalfields by direct waterway with Middle Germany. By the lowering of the level of the river, floods can now no longer occur at Berlin. The total cost of the works, excluding the regulation of the lower Spree, amounted to about 550,000*l.*, to which the city contributed about 390,000*l.*

EVEN though the long-looked-for general revival of trade be, as some suppose, near at hand, it will certainly be some time before the iron and coal trades of Scotland can reap any appreciable benefit therefrom. The resources both of masters and men cannot but be severely crippled by the prolonged strike of the miners of that country. With a great outside show of being "solid," the men are, apparently, very disunited in reality; and it is certain that, but for the "persuasions" of the pickets, male and female, a considerable proportion of those now idle would be in the pits. As it is, many are forced to leave the country in search of employment elsewhere, thus swelling the already overcrowded labour market at our northern ports. That this is a real evil may be inferred from the fact that the Mayor of Liverpool has considered it advisable to request the authorities in Glasgow and Edinburgh to use their influence to dissuade the men out of employ from seeking work in Liverpool. The Scotch miners are in a rather humiliating position. They receive subsidies, varying in amount, from the English Miners' Federation, who are thus in a position if not to dictate, to offer advice, the acceptance or rejection of which would materially affect the continuance of the said subsidies. They have had to throw over their own Secretary on account of his hostility towards their English allies, and although they are willing enough to meet the masters, it is only with proposals suggested by the English Miners' Federation some weeks ago, to which the coal-owners have already declined to accede. We still think that these proposals might at least have afforded a basis for settlement, and possibly more would have come of them had they been presented to the masters in a different guise. They were, however, naturally averse to swallowing English Federation terms, and it now seems not at all unlikely that they will be able to maintain their position without making any concession at all. Work is being resumed this week, under the old conditions, in several different districts.

THE Institution of Civil Engineers has circulated a list of subjects on which it invites original communications, the invita-

tion, if we understand it rightly, not being limited to members of the Institution. For approved papers the Council has the power to award premiums out of the Telford Fund, the Manly Donation, the Miller Fund, the Howard Bequest, the Crampton Bequest, and the Trevethick Fund. From the long list of suggested subjects we extract those which are likely to appeal most to our readers:—

"The arrangements of boilers and engines best adapted for electro-light stations under different conditions.

Steam locomotion for passenger traffic on common roads.

Mountain railways: their laying-out, construction, and working by cables, rack-engines, &c.

The laying-out and arrangement of railway stations.

The encroachments of and reclamation of land from the sea.

Investigations as to the quantity of water yielded by the chalk formation.

The purification of sewage by filtration, precipitation, electrolysis and otherwise.

The means and appliances, other than sewers, for dealing with the refuse of towns.

Plant for the treatment and disposal of waste effluents from manufactories.

The design and construction of modern gasholders of large size.

The methods of enriching gas for illuminating purposes and their relative advantages.

Alternate *versus* continuous electric currents for (*a*) electric-lighting; and (*b*) transmission of power.

The utilisation of electric-lighting plant during hours of small demand.

The application of water-power, and its transmission to a distance by electricity.

The use of electrical motors for driving machine-tools in engineering workshops.

Quarrying operations and the plant employed.

The manufacture and application of steel for structural purposes.

The molecular constitution of iron and steel.

The micro-structure of iron and steel.

The arrangement of engineering workshops, with descriptions of modern machine-tools and appliances.

The organisation and execution of any railway or other work, with reference to the cost of materials, labour and plant."

Papers which have been read at the meetings of other societies, or have been published, will not be accepted. According to the by-laws every paper presented to the institution is deemed to be its property, and may not be published without the consent of the Council. The communications must be forwarded to the Secretary, from whom any further information may be obtained. There is no specified date for the delivery of MSS., as when a paper is not in time for one session it may be dealt with in the succeeding one.

LAST week's fire at the Longton Theatre has rather rapidly followed the Reading fire of only a month ago. Fortunately, neither commenced at an hour when the public was in the theatre, but in the early hours of the forenoon. Both fires resulted in the buildings being completely gutted, the losses in each case being nearly 15,000*l.* This is not surprising, as a theatre fire in a small provincial town, when once well alight, must naturally be beyond the powers of the local firemen. The only protective measure against complete destruction would here be good construction, and the division of the building into numerous risks. Both these necessaries are, however, generally beyond the means of those who start the enterprise. Good exits for the public, and isolation, if possible, is all that can be asked for in such cases, and we hope that both these points will be observed when the re-erection of the Reading and Longton theatres is taken in hand.

THE concluding portion of Mr. P. Vedel's paper on "A Theory of the Actual Earth Pressure" appears in the *Journal of the Franklin Institute* for last month. The author has treated his subject from a mathematical standpoint, but most engineers are agreed that complex formulæ relating to the pressure of earthwork are really of but little practical value. There are many engineering problems which do admit of mathematical treatment, but this is not one of them, as so many assumptions have necessarily to be made, and it is but a waste of time to work out results to three places of decimals when it is quite possible that the whole numbers are not within 50 to 100 per cent. of the truth.

AN architect has forwarded to us the printed conditions issued for competitors for a proposed school in Brougham-terrace for the West Hartlepool School Board, which contains the following rather remarkable sentences:—

"The Board do not bind themselves to accept any plan as sent in, but reserve to themselves the right to require such modifications to be made without charge as they may think fit, and it is a distinct condition of this competion that they shall not be debarred from introducing any improvement merely by the fact that it appears as a feature in some plan which has not been accepted, or be required to make any compensation to the architect in whose plan the feature appears."

Most of us have heard of cases in which suggestions in non-premiated plans have been obviously adopted and incorporated in carrying out the premiated design, but this is the first instance within our knowledge in which a competition committee have published what amounts to an intimation that they intend to avail themselves of anything worth having in the non-accepted plans without recognition of or compensation to the author. It is no doubt perfectly possible that an improvement which is included in one of the plans submitted in a competition may have come within the knowledge of a competition committee or their surveyor from some other source, and in that case they would be exonerated both in law and commonsense from making any compensation to a competing architect for what they could show was an accidental coincidence. But where a suggestion has actually been taken from a non-accepted plan, any committee governed by a proper sense of honourable conduct would feel that they were bound to acknowledge their indebtedness to the architect openly and in a substantial manner. On the other hand, if an improvement included in one of the rejected plans had been honestly come by through another channel, it would be easy to prove this, and the architect in question would have no claim upon the Board. But by the sentence above quoted they have practically implied an intention of making use, without acknowledgment or compensation, of anything good which they may find in a rejected competitor's plans. Such tactics are not very wise, to say the least. The result will be to put architects who have any special knowledge on their guard against competing. In vain the net is spread in the sight of any bird.

EFFORTS are being made to revive the project of buying the freehold of the house at Chelsea which was, for so many years the home of Carlyle, and, we may point out, of his wife, who surely should share in the remembrance. If the purchase can be effected we understand that it is proposed to convert the house into a "Carlyle Museum." Writing, in July, 1834, to a Mr. Bradfute, Carlyle says:—

If you remember Battersea Bridge, and Don Saltero's Coffee-house (celebrated in the *Tatler*), with the ancient row of red-brick mansions clad with ivy and jasmine, shaded by high old lime-trees, along the bank of the river, you have Cheyne-walk, and are within a cat's-leap of Cheyne-row (at right-angles to the Walk, and a miniature copy of it) where in my new workshop, still and clear almost as the Craigenputtoch one, I now write to you. We like our old house extremely; have got it all set in order, out even to the little garden and the vine and walnut-tree. . . . .

The house, which he tells his wife "is eminent, antique, wainscoted to the very ceiling," was then No. 5, Great Cheyne-row. It is not commonly known that in the agreement to take it, at 35*l.* per annum, Carlyle is described as of 47, Frederick-street, Gray's Inn-road. The house was afterwards renumbered 24, Cheyne-row. The tablet set up eight years ago on the side wall of No. 49, Cheyne-walk by the Carlyle Society bears a portrait, in relief, executed by Mr. C. F. Annesley Voysey.

THE exhibition of "The Photographic Salon" at the Dudley Gallery, which is an attempt to show that photography can be used as a medium of the artistic expression of sentiment, is hardly more convincing to us than previous attempts of the same kind. What it does show in the way of satisfactory result in this direction is that much more of the sentiment of landscape may be conveyed than used to be supposed possible in photography; but this seems, as far as we can judge, to be achieved chiefly using the camera so as to leave out detail or render it obscure, and by choosing the point of view so as to produce the effect of what painters in former days used to call "composition." This has been very successfully done in some cases. Mr. Wellington's "Relics of the Past" (2) looks very like a brush sketch; Mr. Maskell, in one or two landscapes (45, 46, for example), has succeeded in producing an effect very like mezzotint; Mr. H. Hinton's "Twilight Grey" (57) impresses one as a charming bit of natural composition; Mr. Eickemeyer's snow scene (117) comes out very well, and gives charmingly the effect of the deep pure white snow with the delicate shadows where footsteps have trampled it. But one cannot help feeling that all the producers of these photographs would have been better employed in endeavouring to draw and paint what they saw. As soon as stronger effects are attempted we become conscious of the stubbornness of the process, as in Mr. Craig Annan's "A Lombardy Landscape," where the pollarded trees are like black silhouettes. Under certain lights a painter might have shown them as such, but not in this hard and over-pronounced manner. Photography on rough drawing-paper has been tried, and even on rough canvas, but the result only looks like bad monochromes in water colour. It is when the figures come in that we realise fully the shortcomings of photography. How common and expressionless the faces look in "A Friendly Gossip" (136). Mr. Cameron shows some effectively-lighted portraits; but where landscape with figures is attempted the figures nearly always spoil the "sentiment" of the scene; so much do we owe in art to the painter's idealising influence. One of the most amusing attempts at the ideal is "A Naiad," a nude young girl standing ankle-deep in a pond among trees. As the subject is taken from life it would be uncourteous to criticise the figure, but it is very far from what we usually figure to ourselves as "a naiad!" In "The Penitent Magdalen," a foreshortened reclining nude figure, Mr. Bergheim has contrived cleverly to avoid too hard a realism, though even here the success of the result as regards sentiment is very doubtful. Miss Reid's "Watching the Boats" (246) is a cleverly-arranged little scene where a young woman and a child are seated among sand-hills looking out to sea; the composition of the scene has been admirably got, but the woman has evidently overdone the attempt to put an expression of interest into her face, and the result again is half absurd, and entirely spoils the intended sentiment. One is reminded of Mr. Du Maurier's scene in the photographer's studio—"Try and look a little pleasant, Miss; I know it's hard, but it's only for a moment." We may point out that a view of Cromer on the wall is erroneously described in the catalogue as "Tenby."

IT is announced that an exhibition of "Artistic Posters" is to take place at the Westminster Aquarium, opening on October 23. We fear the amount of artistic "postering" in this country is not very large, nor have we any great faith in the artistic element of anything started at the Westminster Aquarium, but there may be some interest in the exhibition. The names of some able and well-known artists are announced as among the contributors.

Carved Bosses at Intersection of Roof-groins, Cheltenham College Chapel.

BOSSES, CHELTENHAM COLLEGE, NEW CHAPEL.

The bosses illustrated are those to the main intersections of the groin-ribs; the intersections of the *minor* ribs will be simply foliated. The ribs are here started in block only, as shown; they will be moulded when in place.

The bosses themselves are of considerable size, being 2 ft. 10 in. in diameter, and *in situ* they will be 55 ft. above the chapel floor. The block of each boss as illustrated is 3 ft. 6 in. diameter, and weighs over a ton. The subjects (taking them in the order illustrated) are :—

1. The Resurrection,
2. The Ascension,
3. The Last Supper,
4. The Descent of the Holy Ghost,
5. The Annunciation,
6. The Crucifixion,
7. The Glorification of the Blessed Virgin.

The first five were designed by Mr. H. A. Prothero, of the firm of Prothero & Phillott, the architects of the new chapel, and the sixth and seventh were adapted by Mr. Prothero from ancient croziers now in the South Kensington Museum.

The carving has been executed by Mr. H. H. Martyn, of Cheltenham, architectural sculptor, under the direction of the architects.

Prothero & Phillott.

Theatre, Wakefield.—The building of the Royal Opera House, Wakefield, is now completed, and will shortly be open to the public. Mr. Frank Matcham, of Warwick-court, Holborn, is the architect.

LETTER FROM PARIS.

It has already been mentioned that Alphand is to have a monument in Paris, erected by public subscription, and executed by M. Dalou. When mention was first made of this homage to the eminent engineer, to whom the population of Paris owes its fine promenades and the cleansing of its streets, it was expected that the site chosen would be either in the Bois de Boulogne, or in one of the principal avenues leading to it; instead of that, the subscription committee has fixed on the square of the Tour St. Jacques, near, it is true, to the Hôtel de Ville, but in no other respect a suitable position. The square is small, badly laid out, and not much frequented, probably on account of the proximity of the Halles. It will certainly afford little space for giving full effect to the *ensemble* of the projected monument, which, according to the model just finished, will be of large proportions, and of a fine decorative aspect. These considerations have apparently occurred also to some of the Parisian architectural authorities, for we hear that a proposal will be brought before the Municipal Council of Paris next session for erecting the Alphand monument at the entrance of the Ranelagh, behind the Gare de Passy, and opposite the house where the late Director of Public Works lived for forty years, and where he died. It is to be hoped this last position will be preferred.

Five hundred and thirty-seven architects, engineers, or artists have already demanded permission to compete for the Exhibition of 1900. As the list will not be closed till the month of December, one can easily foresee that the jury of examination will have a heavy task, even to eliminate in the first instance the numerous fantastic, impracticable, or simply absurd projects which always appear in such competitions; and after completing that portion of the task, the jury will still have great difficulty in making a selection from among the designs which may be in conformity with the regulations laid down by M. Picard, who has reserved to the Administration the absolute right to accept anything which appears good in any design, without the obligation to adopt it in its entirety. This will certainly be a very difficult business, demanding not only the examination of the plans, but also the careful study of the reports and estimates which will accompany them, without which, however, it will be impossible to arrive at any practical conclusion.

The proposed reconstruction of the Gare de Lyons, which we have already referred to, is to be taken in hand in the spring, according to the scheme approved by the Department of Public Works, which has been drawn up by M. Jonnart. The site at present occupied by the Paris, Lyons, and Mediterranean Terminus will be considerably enlarged by the acquisition of some ground and building yards adjoining. This will allow space for fourteen lines of rails in place of six, the departure and arrival platforms being opposite to each other, on the same system as that adopted by M. Lisch in the reconstruction of the Gare St. Lazare. Externally the new façade will have a monumental aspect, which will rival that of the Gare du Nord. The works are to

be completed in time for the exhibition of 1900.

It appears that, as the result of the study of the subject in England, the municipal administration has at last decided to construct in Paris, in the quartier de Javel, a refuse destructor of the same type as that at Leeds. If the result is satisfactory other destructors will be erected in Paris, especially in the neighbourhood of Père la Chaise, where several such furnaces will be kept burning continually, to dispose of the refuse from the quarters on the right bank, as well as that from the cemetery.

At the Church of Sacré Cœur a number of workmen are employed in the construction of the great dome, which is now completed up to the first cornice. The interior and exterior cupolas will be built next year. The first will be at the height of 50 mètres, and the second at 85 mètres above the floor of the church. The completion of the campanile will be a longer business, and it is not expected to be finished before 1896; its height will be 125 mètres, which, joined to that of the Montmartre hill, which is 127 mètres, will raise the edifice to a height of 252 mètres above the plain. The cost of this portion of the work will be very considerable; up to this date the subscriptions amount to a total of 27,594,000 francs.

At the Jardin des Plantes the new buildings for the Museum are advancing rapidly, being all completed except the roof. The exhibition rooms are arranged in a large rectangular building; the adjoining amphitheatre will be surmounted by a monumental dome.

A few days since there was opened on the Boulevard Poissonnière, just at the corner of Rue Montmartre, a large public establishment which has been called the "Parisiana Concert." This music-hall, prettily and coquettishly decorated, is the work of M. Jandelle *fils*, architect, with the collaboration of M. Emile Derré, as sculptor, and MM. Beisson and Cron, decorators. At the Champs Elysées a new Salle de Spectacles is being constructed, on the site of the old Panorama, which itself succeeded to the Théâtre des Folies Marigny. Not far from there, at the entrance to the Rue de Ponthieu, there is also a palatial building in progress, intended for meetings, fêtes, and bazaars. Lastly there is talk in the War Department of transferring to the suburbs all the regiments at present in barracks in Paris, as well as all the magazines belonging to the military service. This scheme would lead naturally to the demolition of the different barracks, the value of which is estimated at about 70,000,000 francs, and the building of new barracks in the outer circle of the suburbs, the construction of which would give employment to a number of workmen for some years.

At the Hôtel de Ville the decorations still go on. Since we last referred to the subject, the restaurant of the Municipal Council has been fitted with the stained-glass window executed by M. Carot, after the cartoons of M. Besnard, which figured in the Champ de Mars Salon this year. One of these windows represents the old apple-market called "Le Mail," which was held on the bank of the small arm of the Seine between the Pont Louis Philippe and the Pont de l'Hôtel de Ville. The other represents children sending up luminous balloons on a public fête day. It may be mentioned at the same time that M. Forain is to decorate the walls of this same restaurant. Other windows, of which M. Lerolle has given the designs, will be placed a few months hence in the cloak-room of the Municipal Council.

We may notice here some new acquisitions for our national museums. At the Louvre (where the gallery of bronze antiques has been completely re-arranged) there has been deposited a portrait of the Countess of Anjou, by John Hoppner, as well as the portrait of a man by Lucas Granuelo, a Virgin of the Flemish school of the sixteenth century, and various drawings by the painter Bouvin. At the Versailles Museum there has been acquired a fine portrait of the Empress Josephine, and the study of the head of Marat, by the celebrated Louis David, as well as some water-colours by the same painter, dating from the revolutionary period; also a portrait of Marie Antoinette in prison, by Kocharcky, and lastly, an immense picture by M. Roll, exhibited last year at the Champ de Mars, which represents "La fête du centenaire des États Généraux au bassin de Neptune à Versailles, le 7 Mai, 1889."

On the 14th will take place, in the vestibule of the Hemicycle of the École des Beaux-Arts, the inauguration of the monument to the eminent architect, Duban. The monument, designed by M. Bernier, and of a specially architectural character, consists of a pedestal of white marble supporting a bronze bust of Duban.

An artist of great merit, M. Gustave Lévy, who obtained the medal of honour in engraving at the Salon of this year, died a few days since at the age of seventy-five. In 1846, M. Lévy had obtained a medal of the third class; in 1890 he obtained a medal of the first class, and in 1892 the Cross of the Legion of Honour. His engravings are very numerous. Among the best known may be mentioned that of the portrait of Crémieux, exhibited at the 1880 Salon, and that of the portrait of the Chief Rabbi Isidor, which was in the Salon of 1883. Age had not impaired the firmness of his hand or the delicacy of his touch, as was proved by the engravings which he exhibited this year of the portrait of Renan, and that of Madame Mire, after two paintings by M. Bonnat.

ARCHITECTURAL ASSOCIATION:

SUMMER VISIT TO NORTH MIMMS.

A LARGE party of members of the Architectural Association went on Saturday last to visit the old house at North Mimms, and to see the new additions now being made to it by Messrs. Ernest George & Peto. The old house, built by Ralph Coningsby at a date unknown, but probably about 1600 A.D., has no great family history or tradition—and, indeed, may be said to have been rather unfortunate. Itself the successor of an older house, it has repeatedly changed its owners, and has by them suffered many alterations until of Ralph Coningsby's building there remains little more than the external walls. The additions which are being made for the present owner, Mr. Walter Burns, are vastly larger than the original house, which now becomes part of a country mansion.

The most important alterations to the original house, prior to those now in progress, were probably made at the beginning of this century, for the house changed hands in 1799. At that time the main entrance to the house seems to have been transferred from north to south, and corridors added, diminishing the size of the southern court. The original entrance is now to be re-used, opening into an outer hall, from which is entered the inner or principal hall, which in the hands of Messrs. Ernest George & Peto is becoming a charming feature, its height being that of the full two stories, with an oak roof over, whilst a new canopied fireplace in Ham Hill stone with carved frieze, and an oak staircase and gallery at one end, complete the main points of the interior of this apartment.

The reception-rooms in the old building will now be—the dining-room and breakfast-room on the west side, the two halls already mentioned in the centre, drawing-room on the east side, with library and saloon on the first floor. The new work consists of a long wing projecting on the west from the south side of the old house, and containing a morning-room, open loggia, billiard-room, and gun-room. At the rear of this wing, and on the west side of it, is a second wing, containing kitchen, scullery, laundry, offices, and servants' quarters. The external treatment of the new work follows in material that of the old house—red brick, with diaper patterns of greyish-black brick, and dressings of Bath stone. The detail, of course, follows the method of the English Renaissance, of which the old house is recognised as one of the examples worthy of notice, but Messrs. Ernest George & Peto's work is not bounded in conception or execution by the quality or the finish of the old work. As part of the changes in the *entourage* of the house may be noted the removal of the stables, which, more modern than the house, were built on the south side, and the substitution of a formal garden, with fence walls and iron railings.

The removal of the old stabling has been compensated for by the erection of a fine range of new stables some distance to the west of the domestic buildings. The stable buildings enclose three sides of a quadrangle. Stalls and loose boxes are placed on one side, coach-houses on the other, with at one end a group of four separated loose boxes to serve as an infirmary, and at the other end stalls for visitors' horses. The front side of the quadrangle contains coachman's house, mess-room for grooms, and harness-room. A certain flavour of antique rusticity is given by the use of oak posts and oak window-frames flush with the brickwork; but simple materials, red and black brick and tiles, are sufficient in the hands of Ernest George & Peto to bring about good results. The stalls and loose boxes are lined with green and white glazed bricks with wood dado, and to keep out the extremes of temperature, the roofs have a thatch of Norfolk reeds under the boarding and tiles.

After spending a very enjoyable two hours at the house, the party went to look at the church, which possesses considerable interest from its brasses and memorials, chiefly to the Conningsby's, whose coat-of-mail, with its three coneys, is much in evidence. The church consists of a nave of three bays, with aisles north and south, chancel and north chancel aisle, which latter is variously described as the Lady Chapel, the chantry chapel of St. Catherine, and the Conningsby Chapel. There is a south porch and western tower, which, with its lofty spire, is charming in colour. The church dates principally from the first quarter of the fourteenth century; possibly the date of the chantry chapel of St. Catherine, founded in 1323 by Simon de Swonlond, is approximately that of the greater portion of the edifice.

THE SANITARY CONGRESS AT LIVERPOOL.

(SECOND NOTICE.)

THE REFUSE DESTRUCTORS.

THE President said Mr. Brodie, Mr. Deas, and Mr. Royle would be called upon to read in succession the papers they had prepared, and to explain the designs and drawings arranged on the walls, and the discussion would commence after all the papers had been heard. An animated discussion might be expected in an audience which contained so large a number of gentlemen interested in discovering the best forms of destructor. The occasion might, in fact, be fairly termed the "Battle of the Destructors." Mr. Brodie (late Deputy Borough Engineer of Liverpool) dealt in his paper firstly with the method of disposal of town refuse adopted in Liverpool, and secondly with the treatment of other refuse in a destructor, the design of which had been patented by the City Engineers (Messrs. Boulnois & Brodie). The Corporation of Liverpool had started an exhaustive investigation for the purpose many years ago, under Mr. G. F. Deacon, the City Engineer of that period, and it was finally resolved to try sending the refuse out to sea by a specially-constructed steamer. The first trial which had been made in 1879 had proved very satisfactory, and in 1884 a second steamer was added to the service. Certain matters such as tins, baskets, light materials, vegetable débris, &c., being first removed, the remainder, amounting to 156,000 tons annually on the average, was loaded up into steamers respectively of 300 and 400 tons capacity. Each steamer, which had a speed of about ten knots per hour, contained a large open hold at the bottom of which were twenty hinged doors each 10 ft. by 4 ft. controlled by chains worked by a winding engine. The discharge occupied but a few minutes when the steamer had reached its allotted position (now never less than 26 miles from the town) and within twelve hours it had returned to the dock. The refuse was collected in carts and brought in barges to a convenient position for being delivered into the hold of the steamer, the loading of which was formerly effected by the costly process of hand labour with the shovel. The system of steel boxes, of which there were twenty-four, each having a capacity of about 2½ tons, had effected a very great economy both of time and money. The town refuse carts are driven up to a platform, turning by means of a cantilever arrangement, so that the contents of a number of carts are tipped simultaneously into the boxes in the barge, which then takes them to the special steamer in the dock. By means of this ingenious turning arrangement five men suffice for the rapid loading of a barge, a load of 55 tons being commonly taken on board in 17 min. This had reduced the cost of loading, which previously to 1891 had been 6½d. per ton, to 1¼d. per ton, effecting a saving of 2,180*l.* a year. In 1890 the quantity of town refuse had so greatly increased that the two steamers no longer sufficed, and the new Borough Engineer, Mr. H. P. Boulnois, suggested that the lighter stuff should be got rid of by the Destructor method. A 12-cell Fryer Destructor was completed in July, 1891, but certain improvements had been since introduced, the principal object of which was to get rid of the hand-shovelling which had hitherto been necessary in charging the Destructor at the opening, and which was the most objectionable, uncleanly, and insanitary kind of work. Through these improvements a greater amount of work was get through per cell, and there were no longer any of those repulsive heaps of refuse which were so

often left over formerly, to poison the surrounding air with their noxious fumes. The men were no longer covered with insect vermin, as they had formerly been, and were no longer compelled occasionally to go down among the stuff to facilitate its passage down to the hoppers. The various modes of feeding the stuff in by mechanically-travelling bands and hoppers, all had their difficulties, and therefore they had fallen back on a modified form of the box and truck system, which had been applied in the last twelve cells constructed.

By a back-to-back arrangement of the trucks, each commanded two cells. The charging-openings were closed by a sliding door travelling on rollers and operated by a winch, the doors being made smoke-tight. The principal advantages of these modifications of the Fryer system as claimed are (1) quick discharging of loads by the carters, (2) direct delivery to the cells without hand-labour, (3) the men never need go down among the material, (4) the rapid opening and closing of the doors, which minimises the admission of cold air, (5) the reduction of labour by which 325*l.* a year, or 4½d. per ton destroyed, is saved, (6) cleaner and more sanitary arrangements, and (7) the reduction in the cost of maintenance. The few months' working had proved so well the merits of the arrangement that the authorities of Toxteth, Wallasey, Brighton, and Cambridge were putting up cells constructed on the same principles, and in the latter steam was being produced by the destructor to supply the pumping-station from which the sewage of Cambridge and two neighbouring districts is lifted and delivered to the precipitation works and farm. In this installation there are six destructor cells and three water tube boilers so arranged as to have the boilers sandwiched in between the pairs of cells. A powerful air blast had been added in order to maintain a high temperature.

Mr. James Deas (Warrington Destructor Works) read the second paper, and explained the method in use at Warrington under the patent of Beaman & Deas. It seemed to be now generally agreed, he said, that the most economical, as well as the safest, method, from the point of view of the public health, was to destroy all refuse by fire. The great objection to the forms of destructor at present in use was the possibility of offensive vapours and charred particles escaping by the chimney-shaft into the surrounding air and causing a nuisance to the neighbourhood, the charging arrangements being so constructed that offensive vapours were given off without being exposed to a sufficient heat to render them inoffensive. The necessary conditions for a perfect destructor were:—1, To destroy rapidly unscreened refuse of every kind, without committing any nuisance; 2, to reduce the refuse dealt with to the least possible amount of clinker; 3, to deal with the refuse and bye-products with the greatest economy.

In the new destructor at Warrington, where his system had been worked continuously night and day for the last thirteen months, these conditions were successfully carried out. All the gases were absolutely destroyed by the radiation of the intense heat of the furnace by being drawn through and over the hottest part of the fire, entering into ignition and complete combustion in the chamber (where a temperature of over 2,000 F. was maintained) before finally passing away through the boiler. This intense heat and form of furnace did away with the necessity of a secondary fire or fume-cremator. The results obtained had been certified by the County Analyst, Mr. J. Carter Bell, whose report stated that no trace of mephitic vapours was found in the samples of gases taken. The Corporation of Leeds made an independent test, of which an official report was made by the officers deputed for the purpose, Messrs. Geo. Daley and G. T. Carter. The report stated the following, with other particulars:—Duration of trial, 24 hours; nature of fuel, unscreened refuse; total quantity of fuel burnt, 23 tons 18 cwt.; quantity of fuel per hour, 2,231 lbs. = 19 cwt. 3 qrs. Quantity of water per hour, 255 gals. (12·71 horse-power). Weight of clinker produced, 6 tons 13 cwt. Quantity of water evaporated per lb. of house refuse, 1·14. Average temperature per copper-wire test, 2,000 F. This furnace had been at work since August, 1893, and was now as good as when erected. The author in conclusion said: "From daily experience I find that I can evaporate 1 lb. of water from 1 lb. of unscreened town refuse, and the value of steam, in my opinion, from burning town refuse, will form a very important factor for corporations in the near future."

The third paper, which attracted but little attention among the very practical administrators who formed the bulk of the large audience, because the scheme indicated in it had so far found no visible embodiment, referred to the nauseous smell and fumes given out by destructors; to obviate which a fume cremator was sometimes employed, but this was a sign of a destructor that had been constructed on a wrong principle. The inventors of the Acme Destructor, as they had called it, had kept in view the necessity of complete combustion of all the organic matter, and not the merely putting it out of sight and smell. The drawings showed the method of effecting this. The refuse was tripped into the large receptacle or hopper, from whence it fell through the opening on to the sloping bars, which were set at about an angle of 45 deg.; and as the organic or combustible portion were burned out, the residual material gradually fell to the lowest position, whence it was removed by the attendant at the front and side (using a long-shanked shovel). As quickly as it was removed a further quantity fell down the inclined plane formed by the bars, which, in its turn, was followed by a fresh portion from the hopper. Thus the feeding-in of the material was almost as gradual as though rocking bars were employed. The action of the hanging bridge was important; any vapour evolved from the raw material was deflected partly over the surface of and partly actually through the already incandescent portion lying below, and there it also met the red hot gases arising from the combustion of the lower portion, and becoming ignited, finally passed through the combustion chambers, heating these to such a high temperature that no combustible vapour could escape. As each spadeful was withdrawn, it was followed through the whole system by an equal volume of the raw material, the volatile matter from which being thus slowly evolved had ample time for complete combustion, which could not be the case where large charges were thrown on at one time. Although designed as a destructor only, it was as capable as any other of being adapted to the generating of steam when the material to be burned contained enough heat-producing material; it equally permitted the use of rocking-bars, as also the use of a steam or other blower being applied.

Discussion.

The President having invited discussion to continue till the time fixed for the adjournment for lunch and a visit to the Destructor Works at Chisenhale-street, Liverpool, those at Toxteth, and to the Electric Supply Company's station, a rapid fire of questions followed from many members, and it was decided that all the questions should be answered together on Wednesday, when the discussion would be resumed.

CONFERENCE OF SANITARY INSPECTORS.

This conference, which was also well attended, was presided over by Dr. Francis Vacher (Birkenhead), who, in his opening address, after suggesting that the subjects to be debated should be opened concisely, and be discussed with moderation, offered some sound advice to young sanitary inspectors as to how they might make themselves thorough and efficient officers; especially dwelling on the importance of precision and exactness in observation and in reports. However clever or brilliant or fertile in expedients a man might be, if he worked without system, men having half his abilities would be advanced before him. Method and order were not necessarily inborn characteristics, but they might be acquired, and they were certainly worth acquiring.

Mr. Davenport, C.E. (Nantwich), next read a paper on the effects of the Parish Councils Act upon the future of rural sanitary inspectors. The sanitary inspector of to-day, he observed, was very unlike his colleague of thirty years ago. At one time anyone was thought good enough to be an "inspector of nuisances" as he was then called, but now he must have certificates showing that he possesses a fair knowledge of all those sciences which must be studied by the doctor, chemist, engineer, and a host of other professions or trades. The Act of 1894 would doubtless in some cases be of benefit to the rural inspector and to the district of which he had charge, but its force was greatly weakened by the fact that nearly all the rural officers were appointed for only limited periods of one, two, or it might be three years. The reappointment rested entirely with the district council, and the period of transition was naturally one of great anxiety to the inspector. It often happened that a sanitary inspector in the conscientious discharge of his duties fell under the displeasure of some member of the council or their friends, and his position required strengthening. Cases of hardship had arisen in the past, and possibly some of the sanitary officers would suffer in the transfer of the powers of local self-government, but the author expressed his opinion that in the main they would be justly dealt with. In the meantime, they should continue to agitate for permanent instead of periodical appointments.

Mr. Cooper (Liverpool) gave an account of the progress of the local branch of the Sanitary Inspectors' Association (the North-Western District), and then Mr. Scott Elder (Durham) was called upon to read a paper on the Difficulties and Drawbacks of the "Sale of Food and Drugs Act."

After the luncheon interval Mr. Bland (Barton-on-Irwell) was called on to read his paper entitled "Our Programme." He concluded by giving notice that at the resumption of the Conference on the following day he would move a resolution in favour of assimilating the position of the sanitary inspector with that of the M.O.H. with regard to the period of his appointment, the control of the Local Government Board and of the County Council.

The Congress adjourned for the purpose of proceeding to the Cheshire side of the Mersey to visit the Hospital for Infectious Diseases at Birkenhead, the abbatoirs and cattle lairages, and the Wallasey Waterworks.

Overcrowding houses on land.—The last business of the day was a remarkable lecture given by Dr. G. B. Longstaff, dealing with the question of crowding dwellings together on inadequate sites. In the lecturer's opinion, medical officers of health often attached disproportionate importance to zymotic diseases, while amongst laymen the word sanitation had come to mean drainage. Undoubtedly zymotic diseases were deadly, but he would remind his hearers that while the connexion of diphtheria and scarlet fever with drains was quite open to question, there was no reason to suppose that whooping-cough and measles had any connexion whatever with sewerage arrangements. In England and Wales on the average zymotic diseases caused but one-sixth of all the deaths, whereas to diseases of the lungs, including phthisis, must be ascribed one-fourth of the total. On taking the Liverpool figures for last year, while zymotic diseases caused but one-sixth of the total deaths, diseases of the lungs and phthisis caused nearly one-third. The inference that he drew from these figures was that in hygiene a constant supply of fresh air was of paramount importance. He set ventilation even before drainage in its effect upon health. Liverpool played a very special part in sanitary statistics. It had for many years been an awful example as the nadir of sanitation, appearing over and over again at the bottom of long tables of death-rates, but still more it was an example of what honest persevering work could do. An immense development of manufacture led to the rapid gathering of masses of men, women, and children. The port grew with the manufacturing towns, and the Liverpool of to-day still suffered from the ignorance and neglect of the not very distant past. The fearful year of the Irish famine, followed but two years later by the cholera epidemic, set men a-thinking, and actions soon followed thoughts. In half a century the death rate of the borough had fallen from thirty-six to twenty-six per thousand—an improvement which might be better appreciated when put in the form of an annual saving of 5,350 lives. In one most important matter of hygiene Liverpool was the leading city of the empire, for it had altered the geography of Wales by the formation of a new lake for the purpose of suppling pure water.

In the slums of Liverpool, as of Whitechapel, were to be found over-crowding, filth, pauperism, and ignorance; but yet the Whitechapel slums did not exhibit a death-rate at all comparable with those of Exchange Ward, Liverpool, which reached 39 per 1,000, or of Vauxhall Ward, which reached 43.

A special form of over-crowding of buildings from which Liverpool and other northern towns suffered greatly was that known as "back-to-back" construction. Blocks of cottages built on this plan faced upon two streets without any intervening space, so that except at the ends, each tenement had but one external wall. In addition to other grave disadvantages of the kind commonly called "sanitary," it was impossible to properly ventilate such houses, as a through current of air was out of the question, and it was difficult to light them adequately. To the Surveyor of Manchester, Mr. Allison, were due admirable plans for the partial reconstruction of such blocks, designed to diminish as far as possible and at the lowest cost, their inherent bad qualities. He had long ago come to the conclu-

sion that the carrying out of reconstruction schemes would be greatly facilitated if the municipality were made the authority for closing and diverting highways. The municipality was now the controlling authority as regarded new streets, and it should have the correlative powers.

The lecture was attended by a very large audience, and its interest was enhanced by some limelight views.

The Ladies' Section, one of the most numerously-attended and best-conducted of the sections, discussed subjects connected with "Domestic Hygiene," commencing with an address by the Lady Mayoress, and included papers on "The Ethics of Sanitation" (by Mrs. Percy Boulnois), "Health at Home," "Hygiene in Schools," &c. The ladies alone succeeded in getting through the whole list of papers on the day appointed for their conference.

THE THIRD DAY.

The discussion upon the three schemes of refuse destructors was opened in the Engineering section by Mr. Jones (Ealing), who spoke strongly in favour of the system expounded by Mr. Brodie. It was the best thing of its kind that he had seen. With regard to the system of Mr. Royle, he could only judge of it from the paper; he was not aware whether it had been anywhere erected. He (Mr. Jones) ought to feel gratified at the involuntary testimony borne by Mr. Royle to the value of the cremator he professed to criticise. It was curious to find charged as a fault against it, that it did precisely the work that it was designed to do, viz., that it burnt the fumes. Mr. Deas had given them no idea as to the cost of his apparatus. It looked to him an expensive one. He thought he could erect a three-cell destructor to do all that this one would do at two-thirds of its cost. Mr. Deas had not said much about the nature of his materials. In twenty-four towns you would get twenty-four sorts of refuse. He might from certain materials get a great deal more solid matter in twenty-four hours than from others, but a destructor must be prepared to deal with any refuse in any town. Things could not go on for ever with 2,000 degrees of heat continually indicated on the pyrometer. What would be the condition of this destructor with one cell, say a year or eighteen months hence? What they really required was a destructor simple in construction, ordinary in its working, and effectual in its results. Their object as municipal engineers was to deal with a nuisance, and get rid of it in the simplest, most inexpensive, and yet most efficient manner. He informed the Conference that they were endeavouring at Ealing to utilise the destructor for electric work, and the installation of the electric light would take place in a few days.

Mr. J. T. Wood (Liverpool) said that he had had the management of destructor works on the Brodie and Boulnois principle, and had found them very excellent and very economical in working. He criticised the two other projects from several practical points of view.

Mr. Crowther (Bootle) advocated the principle of cremation for all town refuse. It ought never to be sent to sea. He had had some opportunity of seeing the result of this in the matters thrown up on the shores in the estuary of the Mersey, and what he had seen was anything but pleasant. Questions had been asked as to the cost of destructors, but he could understand that it was not easy to give any hard-and-fast rule as to cost.

Mr. Beaman (Warrington) wished Mr. Jones had not introduced so much feeling into the discussion. (Hear, hear.) Mr. Jones said the intense heat must be destructive of their furnace, in disproof of which he produced four specimen bricks to show the effects of fire in a heat of over 3,000 deg. Fahrenheit. A stalactite of incandescent dust was formed upon bricks exposed to an intense temperature. He criticised the method adopted in Liverpool of disposing of refuse by emptying it into the sea. This could not be done in inland towns, and a great deal could be laid at the doors of the Corporations situated on the sea-coast or upon the tidal waters of the rivers of England for allowing their town refuse, either in a liquid or more substantial form, to go into the sea and rivers.

Mr. G. F. Deacon, C.E., said that as the Engineer of Liverpool at the time when the system of taking the refuse out to sea had been decided upon, he had before that was done been directed to carry out a long series of investigations to ascertain the probable result of that method of disposal. In the first trials a certain proportion of the lighter refuse was found on the surface of the water, but in an estuary like that of the Mersey at Liverpool the heavier matters did not come back. Corks, cinders, &c., had always been found in the outer estuary, and he did not think any more were found now than before the adoption of this plan of disposal. Where they had such a current as in the Mersey, there was no reason why any refuse should come back.

Mr. Monks (Chairman of the Warrington Local Board) invited the members of the Conference to go over to Warrington to see the destructor at work. If Mr. Jones had done so he would not have said what he did. Some municipal engineers evidently did not know what high temperatures meant. He was of opinion that the invention of Mr. Deas would revolutionise the construction of destructors, though he was not surprised at the scepticism that had been displayed.

The President said it was very well to give credit to modern destructors, but credit was also due to the pioneer destructors erected twenty-two years ago to destroy the refuse of tanneries. He would have liked to hear given some estimate of the cost of destructors per cell, and he should have liked to see drawings produced by Mr. Jones.

The readers of the papers were then called upon to reply.

Mr. Brodie, in answer to Mr. Ebbits, said the amount of refuse burnt per cell per day would vary from 6 to 10 tons, according to the nature of the material and the amount of labour employed. With a rate of 10 tons per cell the labour required would be more than in proportion to the increase. Mr. Deas had claimed to evaporate 1 lb. of water for every pound of refuse, but that was more than could be obtained regularly. Ten tons would develop 37 or 38 h.-p., but a proportion would be lost in providing the forced draught. He pointed out that as the bricks produced by Mr. Beaman were broken, nothing conclusive could be drawn from them.

Mr. Deas, in reply to criticisms, said the greater the heat maintained in the furnace the smaller the residuum; that was why at Warrington they had only 27·9 per cent. of clinker, while at Rochdale, according to one speaker, they had 57 per cent. They found the cost of burning was 5½d. per ton, but they hoped to reduce that to 5d., or, if twenty tons per day were burnt, to 4¼d. A proper datum for comparison would be to state in each case how much refuse was burnt per square foot of fire-grate. Extreme heat made perfect combustion and a small amount of residuum. It had been repeatedly stated that the extreme heat employed at Warrington must be destructive of the furnace. He could only repeat that they were regularly disposing of 20 tons every twenty-four hours, at over 2,000 deg. F. temperature, and that the furnace in fourteen months' working had not cost a penny. During the process of burning, fine particles of dust fixed themselves on the crown of the arch, and exposed portions of the furnace, in a stalactitic form, thus protecting the brickwork from the intense heat. The stalactite had been analysed by Mr. Carter Bell, and had been found to contain 55·364 of silica, 15·711 oxides of iron, and 17·362 alumina, the rest being lime, magnesia, potash, soda, and sulphuric acid. In answer to further questions as to the cost of the Warrington installation, Mr. Deas said it was impossible to give an estimate because the plans had been frequently altered during the construction of the destructor, which was an experimental one.

Professor Hele-Shaw said he did not profess to know much about Destructors, but it struck him very forcibly as desirable that they should appoint a committee of persons not interested in any particular form of destructor to prepare a report. Such a committee could collect the necessary data to decide the important question of comparative cost, which could only be properly debated by some such committee.

A resolution was carried to refer this proposal to the Council of the Sanitary Institute.

CONFERENCE OF SANITARY INSPECTORS.

Two papers were left over for discussion on Wednesday—one by Mr. W. W. West (Walthamstow), on the "Powers of Inspectors in the Abatement of Nuisances," and the other by Mr. Wells (Newcastle-on-Tyne), on the "Revision and Consolidation of the Public Health Acts"—but the most important business left over was the discussion on the paper of Mr. Bland (Burton-on-Irwell), on "Our Programme," read on Tuesday. Mr. Bland claimed that in future examinations for Sanitary Inspectors' certificates, practising Inspectors, who had a practical knowledge of the carrying out of the Sanitary Acts, should be on the Examining Board. The proposals of Mr. Bland were adopted against the appointment of Medical Officers of Health, Sanitary Inspectors, or Inspectors of Nuisances being made for only definite periods of time, and in favour of extending the powers of the Local Government Board with regard to tenure of office, so as to apply equally to all Sanitary Officers, Sanitary Inspectors, and Inspectors of Nuisances, as well as Medical Officers of Health, and in favour of empowering County Councils to make representations to the Local Government Board either for or against the dismissal of all such sanitary officers. Mr. Poulson (Staffordshire County Council) submitted a requisition which was generally approved and numerously signed, asking the Council of the Sanitary Inspectors' Association to earnestly consider and proceed forthwith to arrange for the solidarity of all bodies of Sanitary Inspectors, for the prosecution of the question of the security of tenure of office, and all cognate questions affecting the welfare of Sanitary Inspectors.

FOURTH DAY.—ENGINEERING AND ARCHITECTURAL SECTION.

On Thursday Mr. G. F. Deacon, the President of this section, delivered his opening address to a very large audience. He thought it natural that he should begin his address by devoting his first remarks to the city to which he had devoted the first twenty-five years of his professional career — Liverpool — and that he should conclude with a glance at the engineering problems of the great metropolis (London) to which he had gravitated in 1890. Many years ago the late Mr. Thomas Hawksley had shown that the notion prevalent that the health of Liverpool was exceptionally and pre-eminently bad was even then not justified, but it was after 1875 that a change for the better took place in Liverpool beyond that observed in any other of the seventeen great towns with which it could be compared. In the critical year, 1876, Liverpool for the first time obtained a constant water supply, with a good internal pressure of water always in the mains throughout the district. The chief advantage sought in making a supply of water intermittent was to limit the amount wasted through leakage by cutting off the supply from the reservoir to the mains for a portion of the twenty-four hours, but the same thing might be effected by preventing all leakage, and where that was done a constant supply was as economical, and, as they had found at Liverpool, more economical in water than an intermittent supply. "This," said the President, "is precisely what was done in Liverpool in 1874 and 1875. The water which had been formerly saved by curtailing the period of leakage, and of supply for consumption alike, was now saved by reducing the number of leaks without curtailing either the period of leakage or the period of supply for consumption. The sanitary benefits of this constant internal pressure, of a pressure always much above that of the atmosphere, rendering impossible the accession of foul matter to the mains which so commonly occurs—when, during intermissions of supply, the internal pressure falls below that of the atmosphere—scarcely admit of exaggeration; and so strongly has this been felt in Liverpool that all new supplies are connected under constant pressure, and except in cases of rare emergency, the water supply is now never cut off from any district or main. Of such a change, in so short a time, Liverpool might well be proud, but when it is known that after paying all the expenses of that change, none of which were charged to capital, a great revenue has been derived from the sale of the water formerly lost through the leakages of which I have spoken, there is cause not only for pride but jubilation. The facts are not difficult to apprehend. Comparing the mean supply of the four years prior to 1874, with 1876, when intermittent service had entirely ceased, and a constant service under increased pressure had taken its place, we find that in 1876 the loss by leakage had already been so far moderated that a supply was given for metered trade purposes, increased by 25 per cent., and unrestricted for domestic and all other purposes to a population already increased by 33,000 persons, with 12 per cent. less water than in the previous period. When to this I add that the revenue went on increasing from additional water sold to new populations and to new trade consumers, who continued to be supplied from constantly increasing savings of the water formerly lost by leakage, you will understand the otherwise inexplicable fact that without any increase in the charges for water, Liverpool continued from the year 1880 up to the year 1889 to pay the interest upon the expenditure, amounting at that time to more than 1,750,000*l.*, incurred in connexion with the great scheme of water supply which was opened and brought into

use in 1892, and so important had the surplus thus realised continued to be that even now, after the expenditure of 2¼ millions upon the new works, the charge for domestic water supply—nearly two-thirds of the whole—has only been increased—and that temporarily, I think—by 1½d. in the pound, while the charge for manufacturing supplies—about one-third of the whole—has been reduced from 9d. to 6d. in the pound. Never, I believe, in the history of waterworks has a financial condition so satisfactory in all its bearings accompanied the completion of new works the interest upon the cost of which has been defrayed entirely from the revenue of the waterworks undertaking."

Mr. Deacon, applying the moral to London, maintained that our own Metropolis might be similarly benefitted. By acting on a trading principle great results had been achieved at Liverpool, and the author was strongly convinced that the water supply of the Metropolis would not be placed on a satisfactory footing until it also was worked entirely on the trading principle and in the interests of the consumers. The conditions demanded by the companies as to the state of the fittings antecedent to the application of a constant supply were in London unnecessarily exacting. There could be no more difficulty in London than there was in Liverpool in detecting waste, and London had more ample power than Liverpool ever had to suppress the waste when it had been discovered. In 1880 London had a chance of obtaining control of the eight water companies by confirming provisional agreements entered into with Mr. E. J. Smith as recommended by the Select Committee of Viscount Cross, but the chance was unfortunately lost soon after when Lord Beaconsfield's Government was overthrown, and a new Select Committee was appointed which reported adversely to the proposals. Since then nothing had been done for the inhabitants of the Metropolis, though the companies had not been idle. By augmentations of capital from time to time, their property now stood at something like 4,500,000*l.* higher than it did at the end of 1879. Had that scheme (Lord Cross's) been carried out, said the author, "there seems to me no manner of doubt that the same sanitary and financial advantages which have resulted from the policy of Liverpool, might with equal ease have been attained some years ago in connexion with the water supply of London. This is no *ex parte* opinion, but the result of a careful comparison of the system of distribution in London and in Liverpool, and many other places, and as I have said of exact experiment, which may be quite easily repeated in any isolated districts of the metropolis, small or large, chosen for the purpose, as was done in Liverpool more than twenty years ago."

The address concluded with an examination of the grounds on which the last Royal Commission on Metropolitan Water Supply based its belief, as expressed in their report, that "not any danger exists of the spread of disease by the use of this water (Thames and Lea), provided that there is adequate storage, and the water is efficiently filtered before delivery to the consumers." It was well known that no filter could attain its full efficiency for some days after the filtering has begun. It must have time to allow of the formation of a thin film of fine mud and gelatinous matter before the filtering process proper commences, and for at least two days the best sand-filter was merely a depositing-tank. In order that the water supply afforded by filtration might be even theoretically safe, it was necessary that this thin film should be maintained without any rupture over 100 acres of filtering surface. But this theoretical safety was based on a mere assumption on the part of the Royal Commissioners, viz., "that filtration would do for the pathogenic microbes what it appeared to do when in its most perfect condition for the ever-present river species." Under these circumstances, asks Mr. Deacon, "does it not behove us to throw our weight against a policy which would substitute for waters such as those of Loch Katrine, of Lake Vyrnwy, or of Lake Thirlmere, other waters, for the supply of our great communities, the bacteriological purity of which has only been negatively determined, the constant quality of which is uncertain, and the origin of which is impure?"

Sir F. S. Powell, in proposing a vote of thanks to the President for his brilliant address, strongly protested against the practice of many public men of subordinating everything to political considerations. Under the circumstances narrated, a new Government had rejected the policy of the outgoing Administration, and upon this question of health the country—London at least—had suffered from that day to this. If there was one thing more than another that public men ought to bear in mind it was that public health was a large question entirely outside the domain of political controversy (applause). The vote of thanks was cordially adopted.

Papers were read dealing respectively with "Water Supply" and the "Pollution of Rivers" before the adjournment for luncheon, and the afternoon was occupied with the question of the "Housing of the Working Classes," upon which two important papers were read, the last by Mr. H. P. Boulnois, C.E. (Liverpool), the City Engineer.

Professor Henry Robinson, C.E., who read the first paper on "Water Supply," combatted the theory that organisms injurious to health derived from sewage decomposition are practically incapable of being destroyed, but admitted that in the application of the Rivers Pollution Act no efforts should be spared to prevent the streams from being employed as vehicles for carrying off sewage or manufacturing refuse.

Professor Hull, in his paper on "The Water Supply of St. Helens," pointed out the remarkable fact that when pumping operations first commenced from sources in the new red sandstone, the supply was greater than it proved to be after a few years. The supply was at its maximum at first because the rock was saturated with storage water, which was an extra source over and above that derived from annual percolation, and which would be exhausted more or less quickly in proportion to the extra capacity of the pumping machinery over and above that necessary to draw off the quantity supplied by the annual percolation due to the rainfall. The water derived from the new red sandstone rock of south-west Lancashire had a permanent temperature of 60° F. both in summer and winter, was pure and wholesome, and contained salts and carbonates of iron, lime, soda, and magnesia, but not in excess.

The paper by Mr. Spinks, Lecturer of the Victoria University, led to an interesting discussion. The author of the paper said the people waited anxiously for the time when our rivers shall be restored, if not to their pristine state, at any rate to a condition which shall in its quality satisfy the most exacting sanitarian, and in its colour be no longer an offence to the least aesthetic amongst us, so that instead of being a plague and a constant danger to health, by day and night, the river shall be a sweetener of an atmosphere which is sadly too polluted from other sources, when rescued from the degrading uses to which it has been allowed to be put by the indifference of some, the ignorance of others, and the neglect of many.

The discussion of the three papers was commenced by Sir Charles Cameron (Dublin), who, in an amusing speech, showed how completely doctors differed as to the extent to which polluted streams were responsible for outbreaks of epidemic disease.

Mr. Alderman Burt (Richmond), a member of the Thames Conservancy Board, described the difficulty which existed formerly of restraining local bodies or manufacturers from polluting the neighbouring rivers. Under the old law of twenty years ago a notice of twelve months had to be given to stop the flow of sewage into a stream. The period had been shortened from twelve months to three months, and the procedure was much more effective.

THE HOUSING OF THE WORKING CLASSES.

Mr. Goldstraw (Surveyor of Buildings, Liverpool) sketched the improvements in buildings made in Liverpool since 1842, when the Liverpool Building Act was passed, under the sanitary powers possessed by the municipality. In spite of several Acts of Parliament obtained at various subsequent periods, the condition of the courts and cellar dwellings of Liverpool had reached a climax of badness in 1863, and, until the Sanitary Amendment Act of 1864 compelled all courts of less than 25 ft. wide to be open at both ends for their full width into the public street, not much progress was possible. Nearly a fourth of the population of Liverpool, viz., 112,000 persons, at that time lived in 3,173 courts containing 18,610 houses. A by-law as to open spaces made under the Act was even more effective than the clauses of the Act itself. This by-law prescribed that every new house of two stories in height should have an open yard at the rear or side containing at least 150 square feet, with a distance of 15 ft. across between the back of the house and the opposite property; or the distance across in the case of a three-story house must be at least 20 ft., and for a house of more than three stories 25 ft. This salutary by-law remained in force until 1890; and by that time there had been built in accordance with it about 33,000 houses, which, at five persons to each house, would accommodate 165,000 persons, or about one-third of the whole population of the borough at that date.

The Public Health Act, 1875, put an end to the construction of cellar dwellings, and none have been since built in Liverpool. By an act passed in 1889 all existing open spaces in connexion with houses were preserved from being encroached upon by buildings except in accordance with certain regulations and a by-law adopted in 1890 introduced two distinctive and noteworthy features—1st., the distance across the open space to be provided at the rear of every house must be not less than the height of the rear wall of the house, so that the house must not rise above a line drawn at angle of forty-five degrees from the line of the opposite property at the rear. 2nd., the open space required must on each of the three sides abut on a similar open space or on a street. The result was that the open space could never be blocked in by adjoining buildings, but must always share in and contribute to the through ventilation along the rear of all the adjacent houses. The Artisans Dwellings Acts in operation were too numerous and complicated to be treated of in the paper.

The City engineer, Mr. H. Percy Boulnois, prefaced his paper by pointing out the fact that the lecture of Dr. Longstaff was followed by two papers on the same subject. It was a mere coincidence. They were not acting in collusion, and therefore it showed that this subject was filling many minds. The paper dealt with eight types of dwellings built in blocks and flats, which are termed "tenement houses," for the occupation of artisans. Facts, mainly drawn from Liverpool, were put forward rather than opinions, the author premising that the tenants of houses of not more than 20*l.* a year rental might be considered the "working classes," and that the rent to be paid by the poorest of these ought not to exceed 1s. per room per week. It was urged that persons of the working classes could not possibly pay more than one-fifth of their income in rent, including rates and taxes, and labourers earning perhaps 18s. or 20s. a-week must be housed for 3s. or 4s. per week. Many letters had been written to him protesting against the Corporation allowing the erection of the four-roomed cottages of the now prevailing type, on the ground that even working men's families could not live decently in houses with such limited accommodation. In response to this suggestion it can only be said that there were many families which did not require more than two, or perhaps three, ordinary rooms for reasonable conditions of decency and health, and many more which could not possibly pay a greater rent than those two, or three rooms must of necessity command.

An experienced architect in 1865 designed and built for his own investment a block three stories high containing fifty-one tenements of four medium-sized rooms let at from 4s. 6d. to 5s. 9d. per week. They have a continuous balcony at the level of each floor, and a large open space at the rear. On this space wash-houses were erected. But neither the common yard nor the wash-houses were used as intended. The one was a harbour for filth, and the others have fallen to ruin. The tenants could not agree in the joint occupation. 10 per cent. of the houses were unoccupied.

The same result was given by six blocks erected by the Corporation in 1868, and let at rents averaging 1s. 3½d., 1s. 4½d., and 1s. 5d. per room. The most typical cases were two large blocks built very near to the line of docks at the north end. Each block occupies the whole of one side of a street which opens at each end into a main road where tramways are laid. No conditions could be more favourable. A large common open space was provided at the rear of each block. Each of the three stories formed a separate "flat," and had a continuous balcony running along the front. Every house consisted of a living room, three bedrooms, and a scullery with other convenient places, making practically a five-roomed tenement. But even if we reckoned it as having only four rooms, it would be found that as the rents were 5s., 4s. 6d., and 4s., according to the height, the rate per room was but 1s. 3d., 1s. 1¼d., or 1s., as the case may be. And as the rent includes a free gas supply, worth say 3d. per week, the rate per room is actually reduced to 1s. 2¼d., 1s. 0¾d., and 11¼d. Surely, it will be said, here was a success. Unfortunately, the facts told a different tale. Whether it is that the houses are practically too large for the wretched class of tenants, who might prefer a two-roomed house at half-a-crown a week to a four-roomed one at 4s., or whether the property generally was rather unattractive from its

want of repair—not a strong reason with such tenants—the houses "let" badly. Out of 180 tenements in the street, there are 41, or nearly 23 per cent., which are unoccupied, and many of which have apparently been so for years past. Almost all the houses were dirty and somewhat disreputable-looking. The fine open spaces at the rear were of no advantage as either drying-grounds or playgrounds. They were places for refuse and ruffians. The tenants would not even keep the open space clean, and it had to be scavenged by the Corporation. The experiment is therefore a failure.

Two other attempts to provide dwellings in blocks were made by the Corporation in 1883 by the erection of the Victoria-square Dwellings on a site cleared of insanitary property by compulsory demolition, and in 1887 by the erection of four blocks on the opposite side of the same street, from premiated designs of eminent architects. In the first case the average rents per room are 1s. 8d., 2s., and 2s. 6d., and the Corporation are able to secure a 2½ per cent. return. In the second experiment good inexpensive dwellings on the block system have been provided, and the Corporation receives about 3½ per cent. interest, but the rentals are—for two rooms, 4s.; one room, 2s. Therefore the desired shilling rate has not been nearly reached. The conclusion is that, so far as the ordinary builder is concerned, the past experiments have been failures. The dilapidated and dirty condition of the tenement blocks which are in the hands of individual owners, and the great losses which those owners undoubtedly suffer from low-class and unmanageable tenants, seem to point to the conclusion that such blocks should be owned and managed by powerful bodies, companies or corporations, who could and would keep both the buildings and the tenants in fairly decent order. The cheapest of cheap dwellings are unquestionably wanted; they can only be supplied by the strongest of strong hands. In conclusion, the author added that he and the Surveyor, Mr. Goldstraw, has been equally surprised to find that this kind of property did not pay.

Discussion.

Sir F. S. Powell, who opened the discussion, said they were dealing more with minute technicalities than with the general features of the case, but it had been made clear that the results of the experiments so far made were not of an encouraging character, and that the cost of providing dwellings in which the poorest of our people could live in decency, not to say in comfort, was too high for their wages. Parliament had given power to the municipalities to erect these buildings, but had at first given them no power to borrow money for the purpose. Although this difficulty had, during the last Session, been removed, he doubted very much whether it would be possible to make the construction of such houses so remunerative as to attract private capital.

Dr. Sykes (Medical Officer of Health of St. Pancras), referred to the aspect of this perplexing question in London, where half-a-dozen large companies were engaged in trying to solve it. The experience was the same. The large blocks did not pay 3 per cent., and the London County Council had been obliged to increase the price of their dwellings because they could not pay the 3¼ per cent. interest on the money laid out. In London no one would venture to fix so low a rent as 1s. a room. The question was more than a question of cost of land, it was a question of the amount of accommodation to be given. Were four rooms necessary? By means of what Mr. Blashill had felicitously called associated houses was it not possible to reduce the necessary accommodation to one room? Under present conditions three rooms was the minimum number in London. They must have living room, one or more bedrooms, a scullery and washhouse. The minimum rent at 2s. 6d. a room would be 7s. 6d. per week. If Liverpool could not make these houses pay, how much less hope was there of London doing so?

Mr. H. Collins (District Surveyor, City of London) who said he had special experience of this class of buildings, thought that in Liverpool there must be gross mismanagement somewhere. He could point to a large number of such buildings paying four or five per cent. interest. He was the architect of blocks of buildings in Canonbury and Deptford which paid from six to seven per cent. The return was a matter that depended entirely on the management. In a block of buildings in which three families resided if a child of any of them damaged a brick, the whole of the families were warned that if it recurred they would all have to go. The warning was generally sufficient. Mr. Vigors, of the Peabody Fund, had gone into an elaborate investigation to ascertain the lowest rent which could be demanded, and he found that it was 1s. 10½d. per room. A client of his was about to invest 30,000*l.* or 40,000l. under his direction in such property, not from philanthrophic motives but for investment. On the Rothschild property the dividend paid was 4 per cent., at Waterloo 4 per cent., East London 4 per cent.

Dr. Sykes.—Out of capital?

Mr. Collins.—The Rothschild's are not the kind of people to pay dividends out of capital.

Mr. C. S. Pain (Liverpool) protested against the heretical opinions he had heard broached in this Congress under the *ægis* of the Sanitary Institute. He had just heard philanthropy spoken of as discreditable. One sapient president had suggested a return to back-to-back houses, another sanitarian advocated that abomination the slop-closet, and now we were all to live in one room. Was it not time for the Sanitary Institute to disclaim such insanitary teachings as these?

The President reminded the meeting that the President of the Conference of the Engineering Section who had referred to back-to-back houses was not an officer of the Sanitary Institute. He had no hesitation himself in saying that it was impossible to construct back-to-back houses with due regard to sanitary principles.

Mr. Goldstraw and Mr. Boulnois severally replied, the latter adding his absolute condemnation of back to back houses. He agreed that it was an unfortunate circumstance to have been told in that room that a back to back house could be made sanitary.

OTHER SECTIONS.

The most important papers read in other sections were one forwarded by Sir Douglas Galton, and read by Dr. Sykes, on "The Teaching of Hygiene in Schools," and one read by Mr. Alderman Burt, on "The Laws relating to the Acquisition of Land for Isolation Hospitals," &c.

Illustrations.

WHITBY ABBEY.

THE beautiful fragment of the Benedictine monastery at Whitby takes a foremost place both for its architecture and for its position. Raised as it is over 200 ft. above the sea, the grandeur of its architecture is greatly enhanced, and, although but a comparatively small portion remains, its detail will compare with the finest examples of Early English and Decorated work. The original foundation was that of a nunnery, by King Oswy of Northumbria "in fulfilment of a vow made before his great victory over the heathen King Penda of Mercia, November 15, 655, near Seacroft, on the banks of the Aire," of which St. Hilda, niece of King Edwin, was the first prioress. It was refounded as a monastery by William de Percy in the time of the Conqueror. The present buildings, however, are later in date. No Norman work remains, and the whole of the eastern arm and the transepts are Early English, with very pure and beautiful detail. Part of the nave is of this date, and the other parts Decorated.

From its exposed position on the summit of the cliffs, it has suffered severely from storms, and within the present century large portions of the church have fallen. The south transept fell in 1763, the west front fell in November, 1794, the central tower (shown in old engravings) on June 25, 1830, and during a storm in 1839 a portion of the choir was destroyed.

When complete the church consisted of a nave of eight bays with aisles, transepts projecting two bays beyond the nave and choir, with eastern aisles, a central tower rising one story above the ridges, and an eastern arm of seven bays with aisles. The present remains consist of the eastern arm fairly complete, but with its south aisle and part of its south arcade and clearstory destroyed; the north transept fairly perfect, except in its clearstory; one column of the central tower, and the north portions of the north aisle wall of the nave, and west end. One column also of the north transept arcade is still standing, and another column in the nave inscribed, "L. Smelt. Arm. Erexit A.D. 1790."

There are four periods visible in the present remains. The whole of the eastern arm is of the first period of Early English, including apparently the central tower column. The north transept is also Early English, but more fully developed and more elaborately ornamented, and the first three bays of the nave are apparently of the same period. The remaining five bays of the nave and the west front are of very beautiful Decorated design; and the Perpendicular period is represented by the great west window and the west window of the north aisle. With the exception of the inscribed column already alluded to, nothing of a more recent date remains.

The whole of the site of the nave and central tower is filled with large masses of fallen masonry, and the destruction of these portions of the church has been very complete.

Returning once more to the choir, the whole of this and of the transept has been lighted by lancets. Three tiers of triplets form the design of the east end, flanked by turrets square below, and becoming octagonal when clear of the roofs. These turrets contained staircases leading to the choir roof, approached from the triforium level. The presbytery arcade consisted of deeply-moulded arches standing on clusters of eight columns, the lower member of the plinth being of octagonal form. The eastern respond was of a slightly different form. Above the arcade was a triforium—two lancets under a semi-circular enclosing arch, the lancets themselves being subdivided. The clearstory was a single lancet flanked by two blind arches on either side. The central alley was not vaulted, but the aisles were, and the north aisle, with the exception of one bay, retains this vaulting in fairly perfect condition. On the exterior shallow pilaster buttresses divided the bays of the clearstory, and buttresses with bold projections and chamfered angles divide the bays of the aisles. Single lancets light the aisles, the interiors having nook-shafts. There is a severe simplicity throughout this portion of the church, there being no carving except on the corbels of the shafts which supported the roof principals, and in the spandrels of the triforium arches. There are traces of altars at the eastern end—one in each aisle, and two in the centre. Three aumbries remain, and are shown on the plan. The column of the central tower which remains—that at the north-east angle—is a clustered one of fifteen shafts. It remains only to the springing level, and its base is buried in débris.

The north transept is a very beautiful design, later in period than the choir, but retaining many of its features most elaborately worked out. The northern end has, like the east end of the choir, three tiers of lancets, and above, in the gables, an elegant wheel-window, set in an outer order of triangular form. Turrets flank the central gable. The eastern aisle has a single lancet at its north end, two lancets on the east side of the northern bay, and a single lancet in the southern one. There is an aumbrey in the arcading in the north wall of the aisle, and distinct traces in the east wall under the windows of the altars which formerly stood here. The inner face of the north and west walls of the transept are arcaded—trefoil arches, with quatrefoiled circles in the spandrels—but the detached columns which supported them have been destroyed. Among other evidences of a later period is the carving of the caps in many instances, and the enrichment of the arches with dog-tooth ornament. The exterior of this transept—the Abbey was approached from the north-west—was of an elaborate description, and the buttresses on their northern and western faces were ornamented with canopied figures. The figures have disappeared, but many of the canopies remain. There was a doorway in the north-west angle leading to the staircase in the turret, and in the upper portion of the north-east turret was a similar staircase. What remains of the three eastern bays of the north aisle of the nave show it to have been probably of the period of the transept. It was vaulted, and had a single lancet in each bay. The buttresses are not central on the outside, and although the upper portions have evidently been rebuilt, they do not bond with the main wall; the plinth itself remains and shows them to be in their original position. Of the remaining five bays of the nave aisle the wall and windows remain of the first two westward of the Early English portion. Each bay is filled by a large four-light Decorated window, of very beautiful design, with tracery in the head of that type known as "Kentish," and ornamented throughout with delicate carving and mouldings. The next bay has a doorway of three orders, the inner order trefoiled, and from evidences on the exterior there seems but little doubt that the space between the buttresses was vaulted over and formed a porch to what was one of the principal entrances of the church. Of the remaining two bays, sufficient remains to show that they had windows of the same character as the two still standing. There are traces of a stoup on the western side of the doorway.

The west front of the church has fared badly, and from the soft nature of the stone has crumbled more than the other portions. But sufficient remains to give some idea of the grandeur of the design. In the centre, set between two boldly-projecting panelled buttresses, was a large doorway of five orders, with rich mouldings and carved caps. The inner order was apparently sub-divided (as in the case of Croyland, shown in our view of that Abbey in *Builder*, September 1st) with a central shaft and double doorways. The inner face of the walls was panelled. Over this was a large west window, an insertion in Perpendicular times, and transomed. Flanking the window were staircase turrets communicating with the roof and with each other by means of a passage across the splay of the window.

There were also similar passages in front of the aisle windows, communicating with the turrets at the angles of the aisles, which had staircases, approached by doorways in the angle, leading to the aisle roofs. The west windows of the aisles were of three lights, likewise Perpendicular insertions. That on the north side remains in fairly good condition.

One of the strongly-marked characteristics of this building, clearly shown by the ground plan, is the considerable divergence of the nave from the line of the transepts and eastern arm. We know, of course, that many instances occur—Bristol Cathedral (given in our Cathedral Series) was a case in point. At Bristol it was the rebuilding on earlier foundations, and possibly it may be the same at Whitby. Nothing in the site at Whitby would seem to have rendered such a treatment necessary, and it remains as a somewhat remarkable instance of orientation. The bases of the columns, shown in outline on the plan, do not at present exist, but it has not been a matter of difficulty to complete the plan of the church from what remains with accuracy.

The monastic buildings have entirely disappeared. Much stone from the Abbey has doubtless been used for neighbouring buildings, notably for the building known as the Abbey House, situated south-west of the church, built by Sir Francis Cholmley, about 1580, and dismantled about 100 years back on account of serious injury to the structure by storm.

The stone used in the Abbey Church is of two kinds—a brown and a grey sandstone. Both have been used without apparently any very definite scheme of colour having entered into the minds of the builders, but in the early portions—the choir and transept—the use of the greystone predominates for exterior work, and from its greater durability has stood the effects of time and weather better than the brown. This latter has been more freely used in the Decorated work of the nave, and consequently its detail is badly preserved. Both stones seem to have been used in about equal proportion for the interior.

The total internal length of the church is 283 ft., the breadth across the choir 62 ft., the breadth and projection of the north transept 44 ft. and 36 ft. respectively, and the breadth of the choir 62 ft. There are no monuments remaining.

ST. LAWRENCE'S MONASTERY AND COLLEGE, AMPLEFORTH.

The illustration shows bird's-eye view from the north-west of the scheme of proposed new buildings at St. Lawrence's Monastery and College, Ampleforth, as revised from the competition plans published in a previous number.

The part being proceeded with at present is the south block of the monastery, extending from the church up to the return west wing, forming the west side of the monastery quad.

The foundation-stone was laid in July last by the Bishop of Newport and Menevia.

The new building will provide twenty-five monks' cells, monks' calefactory, lecture-rooms, music-room, work-rooms, and large (temporary) library, &c., lay brothers' calefactory work-rooms, &c., &c.

It will be seen from the plan that the west wing when built will provide further cell accommodation (for forty monks altogether), lecture-rooms, &c., and the large monastery library at the end of the wing.

The south block on the east side of the church extending from the church up to the present college buildings, built in 1862 (shaded on plan) will be appropriated to further extension of the college—new class-rooms, libraries, and play-rooms, and a large additional dormitory for fifty more boys.

The new refectory for the boys and the monks' refectory are placed at the back, adjacent to the new kitchen and servants' offices.

The approach from the Hospitium (Guest House) to the monastery, college, and church is by the Hospitium corridor down the grand double staircase to the central hall (43 ft. by 31 ft.) opposite the north transept and entrance to the church, and whence the monastery, cloister, and college corridor (together over 500 ft. long) branch off to west and east.

The plan given hardly shows this very clearly, being an attempt to show the ground floor of Hospitium and the general ground floor plan together; whereas the Hospitium ground floor is 20 ft. above the ground floor level of monastery and college.

The approach for "Externs" (from the village) and for servants, to the church is by a separate corridor (over the cloister shown in view running north up to the high road) cut off altogether from access to the college or monastery enclosure.

The monks at Ampleforth are of the Benedictine order—the order to which we owe most of our old cathedral churches, and their house claims descend from a continuous tradition with the pre-Reformation Benedictine Abbey of St. Peters at Westminster.

When the last Abbot was sent to the Tower in Queen Elizabeth's reign, and his monks driven from Westminster, some of them settled at Dreulewort, in Lorraine, and resumed their monastic life. There they remained till the French Revolution drove them and all religious orders out of France. Under Prior Appleton they eventually settled down at Ampleforth in 1802, in the old manor-house.

The old buildings, which have been gradually extended since that time, are now doomed to give way to others more suitable and worthy of the better prospects and position of the Monastery; and the Church, though only built about thirty years ago, is not now thought good enough for the wants or ambition of the monks.

An entirely new church, on a larger scale altogether, is shown in the perspective view.

The architect is Mr. Bernard Smith, of London.

B. S.

CARTOON FOR AN ALTAR-PIECE.

This drawing, by Mr. G. Woolliscroft Rhead, occupied a central and prominent place in the Architectural Room at the last Royal Academy Exhibition. It was a design made for the exhibition only, and has not as yet been carried out.

As an attempt to treat the tragic subject of the Crucifixion in what is called a decorative manner, while suggesting something more than mere decorative effect, it is, we think, very successful. The level bars of landscape and cloud contrast effectively with the upright lines of the main composition, and give at the same time an expression of solemnity to the whole. The kneeling figures almost entirely hidden in drapery were perhaps suggested by Flaxman's not infrequent treatment of the figure in this manner.

COMPETITIONS.

Burnley, Lancashire.—In a limited competition for proposed new Congregational Church and school extension in Hollingreave-road, Burnley, the committee, with the assistance of their assessor, Mr. Dawson, F.R.I.B.A., of Lancaster, awarded the first premium to Messrs. Hitchon, Son, & Lancaster, architects, Burnley, and the second to Mr. J. T. Landless, architect, Nelson. The school extension is placed under the chapel, and consists of eight class-rooms and one larger room, with the necessary conveniences. The chapel proper will be 72 ft. by 45 ft., with shallow transepts at the north end, and gallery over the south end. The seating accommodation is reckoned at about 650. The committee have already met and instructed the architects to prepare the working drawings.

ARCHITECTURAL SOCIETIES.

The Manchester Society of Architects.—The first meeting in the session of 1894-5, was held at 36, George-street on the 2nd inst., and the President, Mr. John Holden, F.R.I.B.A., F.S.I., delivered his address to the members. After reviewing the proceedings connected with the reconstruction of the society in 1891, which had resulted in a large increase in the membership, which now numbered 135, he urged the members generally to assist in carrying out the objects of the society, and by close attention to the rules and regulations to minimise the labours of the honorary officers. He then paid a kindly tribute to the memory of those gentlemen who had been removed from the roll of members by death, viz:—Messrs. John Elgood, Joseph S. Crowther, William Charles Take, James Maxwell, and Lawrence Booth, all good men, whose loss would be especially felt by the older members of the society; also of Mr. J. H. P. Leresche, Barrister-at-Law and Stipendiary, who had for the last ten years occupied the position of Honorary Legal Adviser to the society. At the same time he informed them that the council had nominated Mr. William Goldthorpe, Barrister-at-Law, as his successor, and that he had accepted the appointment. After briefly touching upon the question of competitions, of builders depositing priced quantities for works to be carried out, and other matters, he also said that he hoped before long to see a Chair of Architecture founded at the Victoria University; this would be a great advantage to the students, and he advised them by increased efforts to show that this would be appreciated by them. He then addressed the senior members, strongly urging them to contribute to the education of the younger members by reading papers, by giving information on matters connected with the profession, and by supplementing the books in the library, especially referring to the very generous gift of books by Mrs. Whitaker, the widow of the late William Wilkinson Whitaker, architect, of Manchester. In addressing the younger members, the President urged them by careful study, and by passing the necessary examinations of the Royal Institute of British Architects, to qualify themselves to, in their turn, take office as Presidents or Vice-Presidents of this Society, and to carry on the work which has for the last thirty years been going on, and which has given the Society the first place out of London. The President afterwards delivered the prizes which had been awarded to the students for work during the past session, the principal prize of books of the value of ten guineas, for the most satisfactory progress made by the Society's students in the architectural classes arranged by the Council with the committee of the Technical School, being awarded to John Ormrod, and the second prize of five guineas being divided between William S. Beaumont and Alfred R. Parker, whilst the other prizes respectively were given to A. E. Corbett, J. C. Dewhurst, Isaac Taylor, and T. W. Hoolley.

Glasgow Architectural Association.—The usual monthly meeting was held on Tuesday evening in the rooms 114, West Campbell-street, Mr. A. N. Paterson, President, in the chair, Mr. Wm. Fraser, A.R.I.B.A., read a paper on the "Planning of Country-Houses," being a continuation of the series of essays on planning contributed by members during last session. Treating the subject in the wider meaning of the term, and dealing with cottages and villas, as well as the larger country-houses, he emphasised several matters to be attended to in the planning of cottages for labourers, pointing out that three or four rooms, consisting of a living-room, sleeping-room for parents, one for boys, and one for girls are necessary for the requirements of decency. Passing to a description of villas and larger houses he mentioned how difficult it is to say absolutely what are the exact requirements of a country house, as the plan is greatly influenced by the particular ideas of a client, and by the amount of money he is prepared to spend. The chief points to be considered were isolation of the inhabited rooms from the working part of the house, convenience and compactness, light and air, aspect and prospect, all of which taken together tend to make a comfortable home. The essayist then touched more particularly on the different apartments of a house, describing in some detail their sizes, requirements, and position in relation to one another. He strongly advocated the use of the hall in small houses as a living room, thereby saving the space occupied by the ordinary lobby.

Discovery of a Roman Villa near Cardiff.—There have lately been discovered, on the Ely racecourse near Cardiff, the remains of an extensive Roman villa, which are being uncovered by the Cardiff Naturalists' Society. The results so far are described as being most satisfactory, and prove the existence of prehistoric dwellings, upon the foundations of which a large and important Roman villa was erected. There are indications also that when this had fallen into decay, a smaller Roman villa was built upon its foundations. The remains of the walls at present discovered are of great thickness and solidity. Among other articles unearthed were flint arrow-heads, large quantities of tesseræ, fragments of Samian ware and black pottery, a considerable quantity of coloured and figured wall plaster, Roman coins of various dates, fibulæ, and broken glass.

Books.

Notes on the Testing and Use of Hydraulic Cement. By Fred P. Spalding, Assistant Professor of Civil Engineering, Cornell University, Ithaca, N.Y. Ithaca: Andrus & Church, 1893. Pp. vi. and 108.

THIS little book is, according to the preface, "designed for use as a text-book, in a short course of instruction, as well as to serve the purpose of a hand-book in the laboratory." The nature and properties of cements are briefly and carefully described in the first chapter, but we must take exception to the statement on page 20, running thus, "When the cement is finely ground and the sand of good quality, a mortar composed of *equal parts* of each will, *as a general thing*,* finally attain a strength as high as, or higher than, that of the neat cement." Experiments have shown that an increase of strength does accrue through the addition of a small proportion of good sand or of coarse cement grains, but not to the extent stated by Mr. Spalding. Chapter II. is entitled "Cement testing," and contains articles on "objects of testing, weight and specific gravity, fineness, rate of setting, tensile strength, ordinary tests for soundness, accelerated tests for soundness, chemical analysis, compressive tests, adhesive tests, microscopic examinations, abrasive tests, and air-slaking." Forty-seven pages are devoted to this chapter, and of these no less than sixteen are occupied by the article on tensile strength; the other subjects are therefore treated with a brevity which, in some instances at least, ought to have been avoided. For instance, in the sections on adhesive and abrasive tests, nothing is said as to the results which good cement ought to give when subjected to these tests; the student, therefore, is left quite in the dark as to what standards he ought to adopt in practice. Again, we are simply told that "the compressive strength of mortar is commonly stated to be about ten times its tensile strength, although there is of course a considerable variation in the actual ratio." It would have been more satisfactory if the author had said that the mortar, of which this common statement is made, is a 1 to 3 mixture of cement and sand, and that the ratio between tension and compression varies between 1 to 7 and 1 to 20. No figures are given to show the effect of different proportions of sand in mortar, and the transverse strength of cements and mortars is not mentioned at all. Two statements of the author as to the adhesive and cohesive strength of cement, although they are not quite contradictory, yet do not bear juxtaposition; on pages 24 and 25 we read:—"It has been found in general that the cohesive and adhesive strengths vary in somewhat the same manner for different material, and the determination of cohesive strength is commonly relied upon as a test of value," while on page 71 we read:—"It is to be observed that the adhesive strength is not necessarily proportional to that of cohesion, even when the fineness is the same, and that different varieties of cement may possess the property of adhesion in quite different degrees." Mr. Mann's experiments, we may observe, showed that the ratio between the adhesive and cohesive (or tensile) strength of neat cement varied from about 1 to 5 to 1 to 9 at seven days, and from 1 to 3 to 1 to 5 at tweuty-eight days. Chapter III. is entitled "The Use of Cement," and extends to nineteen pages only. The section on the freezing of mortar is somewhat unsatisfactory, but the subject is fraught with difficulties, and the final word cannot yet be spoken on it. Chapter IV. consists of a list of periodical literature relating to hydraulic cement, which, although not exhaustive, will prove extremely useful to the student. In some parts of the book there is, as we have already indicated, a certain lack of definiteness, but on the whole, we can recommend the work as a clear and concise statement of the main facts relating to the testing and use of hydraulic cement with which the student ought to be acquainted.

The Practical Designing of Structural Ironwork. By Henry Adams, M.Inst.C.E. London: E. & F. N. Spon. 1894.

The system of employing large quantities of iron and steel in modern buildings is now so much adopted that it becomes desirable for architects to be acquainted with those principles upon which the design of girders and columns are based.

In America, where this method of construction is so extensively used, the ironwork required is often of such a complicated character, that good designs can only be prepared by those who have made this branch of the profession a specialty, but in this country the work is generally of such a simple nature that anyone having but a moderate knowledge of the subject would be able to do all that is required.

At intervals, during the last ten years, the author of the above work has issued small pamphlets on the calculations and designs of ironwork for simple structures. These were prepared for the use of the students in the Engineering Department of the City of London College, and as they have proved of considerable use to engineers and architects in actual practice, Mr. Adams has now republished them in one volume, adding several new notes and other information relating to the subject.

The author commences by showing how to make all the necessary calculations for a cast-iron girder, and for a flitched beam. After describing various kinds of rivetted joints he proceeds to show how to prepare the working drawings for a wrought-iron plate girder to support a load of twenty-five tons distributed over a span of 20 feet. Besides these examples there will be found complete information on designing cast-iron columns, small lattice girders, and wrought-iron roof-trusses. The calculations necessary to proportion all parts of these structures are always clearly given and explained, and followed in each case by a working drawing, so that the student is able to see how the formulæ he has made use of are applied in practice.

The book will recommend itself to those commencing the study of ironwork, because it is written in a thoroughly practical manner, and as each division of the subject has a chapter to itself, it is not necessary to master the whole work before any of its contents can be applied.

It was not the aim of the author to produce a book dealing with difficult ironwork, but it will be found he has omitted but very little that is likely to be of general use in the office of an engineer or architect.

Designing Ironwork. By Henry Adams, M.Inst.C.E. London: 60, Queen Victoria-street, 1894.

In the first series of pamphlets published under a similar title the author only dealt with ironwork structures of a comparatively simple character, suitable for explaining the principles of practical designing to those commencing the study of this subject. In the second series now being published the author proposes to show the method of designing work of a more advanced type, and the first part, consisting of some twenty-six pages, is wholly occupied with the calculations and working-drawings of a steel box-girder, having an effective span of 50 ft.

Everything that is necessary for the student to know to enable him to design a girder of this kind is clearly explained, and there would be no difficulty in constructing the work from the information on the drawing given by the author.

Stresses in Girder and Roof Trusses. By F. R. Johnson, A.M.Inst.C.E. London: E. & F. N. Spon. 1894.

In this book the author has attempted to simplify the calculation of stresses in lattice girders and roof trusses by giving stress constants for both dead and live loads, which only require to be multiplied by the panel load to give the maximum stress in any member of a truss.

We think that most engineers and architects who have such structures to design will prefer tc make their calculations, step by step, in the usual way; when these are made, however, they can be rapidly checked by the many tables given in Mr. Johnson's book.

An Introduction to the Differential and Integral Calculus. By Mathew Wyatt. London: Whittaker & Co. 1894.

This little book has been written for students reading without the aid of a tutor, and the author has, therefore, fully worked out all the examples given to illustrate the subject.

A very moderate acquaintance only with this branch of mathematics often proves of great value to the scientific man, and as Mr. Wyatt explains the fundamental principles in such a simple manner, anyone with a little trouble could in a short time learn quite sufficient from his book for most practical purposes.

A Handbook of Ornament; with 300 Plates, &c. By Franz Sales Meyer, Professor at the School of Applied Art, Karlsruhe. Second English edition, revised by Hugh Stannus, F.R.I.B.A. London: B. T. Batsford. 1894.

Mr. Stannus states in his preface that his chief object in editing the English translation of Herr Meyer's book has been to revise the terminology, and to render it more clear for students, without any alteration and addition which would seriously interfere with the original author's work.

That the English translation of Herr Meyer's book has been appreciated in this country is evident from the fact of a second edition being called for. As an analysis and classification of the various forms and applications of ornament it is remarkably full and comprehensive, and should be a very useful book for study or reference, though we do not think anyone will be stirred by it to artistic enthusiasm, or will be helped towards becoming an artist by the study of its pages. Like some other German works on ornamental art, it is full of information but evinces little artistic feeling; there is a hard mechanical character about the majority of the illustrations which is not calculated to attract the English student, however it may appeal to the German. Some of the most beautiful schools of ornament—Indian, Saracenic, and Byzantine, for instance—hardly seem to be illustrated at all; and the illustrations contain a great deal of very bad ornament, the badness of which does not seem to be evident to the mind of the author, and of course is not pointed out to the reader. In short, no one is likely to be made an artist by the study of the book, though it gives a learned if not quite complete historical *résumé* of various types of ornament.

Les Saint-Aubin. Par Adrien Moreau. Paris: Librairie de l'Art. 1894.

The Saint-Aubins, of whom M. Moreau gives us a biographical sketch with a number of illustrations of their designs and portraits, were designers mainly of ornamental work, head-pieces, &c., in the pretty but affected French style of the eighteenth century. This at least seems to have been the principal work of Augustin Saint-Aubin, varied by fashionable portraits and occasional representations of ceremonial scenes. There are three of the family whose works are illustrated: Charles-Germain, Gabriel, and Augustin, the latter being the most important and the most largely illustrated. There is a good deal of interest in some of the scenes illustrated, from the point of view of the social historian. The decorative designs have an old-fashioned grace and fancy of their own, but are in a style the interest of which at the present day is chiefly historical. We may be grateful, however, for a book giving us some information about a family of French artists of the last century about whom little is known in England.

Correspondence.

To the Editor of The Builder.

THE NEW LONDON BUILDING ACT.

Sir,—I have read with much interest, and, I may add, with much satisfaction, your leading article upon the London Building Act,* 1894. There is, however, one passage to which I must take exception, since you are evidently under a total misconception as to the facts.

Alluding to those portions of clauses 13 and 41 which exempt from the operation of the clause "dwelling-houses to be inhabited or adapted to be inhabited by persons of the working class," you go on to say: "These provisions we take to be in reality bids for the working-class vote on the part of the Council. That such bids should be made on the part of a body of such political prejudices as the London County Council has turned out to be need surprise no one; but that they should be solemnly incorporated in an Act ostensibly designed for the general public welfare is contemptible." That such insinuations should be made against the Council is the not unnatural result of its past actions, but that in the particular instance the accusation is wholly unfounded I most positively assert. As the instructions to the draughtsman have all passed through me, I am in a position to know the facts, if anyone is. Briefly, the history of the matter is as follows:—

The deposited Bill treated all domestic buildings alike, but the provisions as to open space at the rear of houses met with such a storm of opposition from architects and surveyors, especially gentlemen connected with large London estates, and of great eminence in their profession, that it was felt to be hopeless to attempt to carry the Bill in that form. We pleaded that the "Housing of the Working Classes Act, 1890," compelled the Council to clear away slums at enormous cost to the ratepayers. Moreover, the mere closing of old houses as provided for by the Act, was but too likely to intensify the evil, since there was nothing to prevent their owners from replacing old cottages by lofty buildings that were even worse from a health point of view, and

* The italics are ours.

that, as a matter of fact, in several cases portions of new buildings had been closed under magistrate's orders as *unfit for human habitation.* On behalf of the ratepayers we pleaded for protection. Our opponents could not but recognise the strength of our position, but said that the argument did not apply to better-class houses, and consequently an attempt was made to meet them by defining in terms of measurement the houses that were to be especially dealt with. I insisted repeatedly upon the necessity of "applying the two-foot rule," but was at length compelled to yield, with the result that the vague words were substituted. The distinctive treatment was initiated years ago by "Torrens' Acts" and "Cross's Acts," now incorporated iu the "Housing of the Working Classes Act, 1890." There is no doubt that the evils of overcrowding—*i.e.*, of deficient light and air—are met with much more frequently, or to a more serious extent, in the houses thus vaguely alluded to, and it is some satisfaction to know that little or no difficulty has in practice arisen from the lack of a definition. Barristers seem to abhor definitions, and persuaded the Parliamentary Committees to strike out our definitions of "building" and "structure."

Whatever the objections may be to differential treatment, the Council is not to be blamed for it. The idea originatad in the brains of such men as the late Lord Shaftesbury, the late Mr. Torrens, and Lord Cross before the creation of the London County Council, and was imported into the London Building Act by men outside the Council, whose object in "bidding for the working class vote" is not apparent.

A word as to the "centre of the roadway." The object in making the defined centre remain the legal centre is to make the owner on either side set back to a like extent, so that each shall in turn contribute an equal amount to the widening.

You do not seem to have noticed that an "inhabited" room includes a "living room" as well as a room in which some person passes the night.

Compensation is not granted to owners for greater width of road than 40 ft. in *all* cases.

Clause 49, regulating the height of buildings in reference to the width of streets is a re-enactment. Of course, it is not logical, but it is a strong inducement to owners to lay out new streets 50 ft. in width. The height in this, as in all cases, is measured in the manner described in definition (21), and does not include the roof.

G. B. Longstaff,
Chairman of the Building
Act Committee of the L.C.C.

*** We ought to have remembered, certainly, that the separate definition of "height of a building" covered the case of the street less than 50 ft. wide. As to the "habitable room" we perfectly understand the Act, and Dr. Longstaff misses our point. A room is "inhabited" if it is slept in at night or if it is connected with a room which is supposed to be slept in at night; otherwise not. Our criticism was that rooms such as offices and chambers, in which people often pass many hours daily, but which are not connected with any sleeping-room and therefore not legally "inhabited," ought to have been classed also as "inhabited" rooms, and that it is a sanitary defect in the Act that they are not.—Ed.

The Student's Column.

DETAILS OF RURAL WATER SUPPLY.—XIV.

STORAGE OF WATER (*continued*).

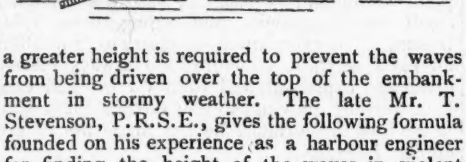
THE site of the embankment, or dam, having been thoroughly proved by means of trial-holes at least 5 ft. square, and of sufficient depth to admit of a proper examination of the strata, the next step is to determine whether it is to be constructed of earth or masonry. Where there is a good compact clay foundation, and the clay is abundant in quantity, the dam must, for economical reasons, be formed of that material. Where, however, the position and quantity of suitable rock make conditions favourable for the construction of a masonry or concrete dam, then undoubtedly such a dam would be better, although the comparative cost would be much greater. Having decided upon the material for construction, it must be disposed of in the design according to experience, the recognised laws of such structures, and the peculiar circumstances of the case.

Earthern embankments, as employed in the storage of water, consist, as a rule, of two trapezoidal-shaped figures formed of earth, clay, and stone, supporting a centre core of puddled clay, increasing in width directly as the depth (fig. 17, Paper XIII.). The proportions of earthwork dams are limited by the angle of repose or slope at which the material employed will stand. With cohesive materials this depends upon their power of absorbing water, which can best be found by experiment. Experiments upon several clays used in reservoir embankments show that the absorption by weight varies from 12 to 53 per cent. In the latter case the embankment failed several times during construction. In practice the outer slope should not be less than the ratio of 1½ horizontal to 1 vertical, and, as a rule, it is made either 2 or 2½ to 1. The inner slope, which has a greater tendency to slip, owing to its angle of stability being reduced by the water, should not be less than 2½ horizontal to 1 vertical, and is more frequently made 3 to 1.

The total width of the bank at the level of the top of the puddle-wall should not be less than three times the width of the puddle at that level. This width from slope to slope varies from 10 ft. to 30 ft.

The height of the embankment above high-water level varies according to circumstances. In numerous cases where the inner slope is continued up to the top of the embankment (fig. 20)

Fig 20



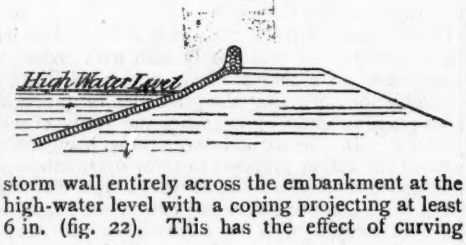
a greater height is required to prevent the waves from being driven over the top of the embankment in stormy weather. The late Mr. T. Stevenson, P.R.S.E., gives the following formula founded on his experience as a harbour engineer for finding the height of the waves in violent squalls:—

$$H = 1{\cdot}5\sqrt{D} + (2{\cdot}5 - \sqrt[4]{D}),$$

where H = the height of the waves in feet, where D = fetch in miles, which is the longest straight line that can be measured from any part of the dam to any part of the reservoir, when the latter is full and overflowing.

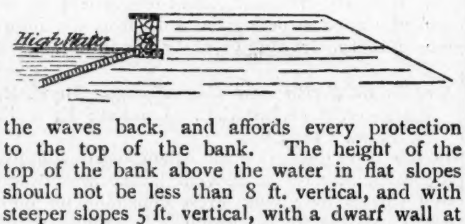
It is found to be more convenient to make the slope steeper above the water line with a storm wall at its summit (fig. 21), or to build a

Fig 21



storm wall entirely across the embankment at the high-water level with a coping projecting at least 6 in. (fig. 22). This has the effect of curving

Fig 22



the waves back, and affords every protection to the top of the bank. The height of the top of the bank above the water in flat slopes should not be less than 8 ft. vertical, and with steeper slopes 5 ft. vertical, with a dwarf wall at the water-line not less than 4 ft. vertical.

The width and batter or taper of the puddle-wall varies with the materials of which it is composed. The clay used for the puddle should be carefully selected, and be of good tenacious quality, comparatively free from loam, friable stones and vegetable matter. A small proportion of gravel is an advantage, and increases its stability. The clay should be turned over and weathered for two or three months, and then well cut, tempered and worked in stages, and afterwards passed through pug-mills. It is then conveyed to the trench and inserted in layers. The top width of the puddle-wall varies from 3 ft. to 10 ft., and tapers outwards at from 1 in 8 to 1 in 16 down to the surface level, where it is either keyed into a concrete shoe as a base (fig. 23) or is continued down in a trench until a sound foundation and retentive material are reached. The trench puddle is frequently carried down at a reverse or inward batter at rates of 1 in 8 to 1 in 16, according to circumstances (fig. 24). When the pervious strata extend to a considerable depth it may be necessary to carry the trench down vertically the full surface width of the puddle-wall. Where this is done the bottom of the trench is covered with a layer of cement concrete connected to a key-piece of the same material, the layer at the base being 12 in. or more in thickness. Where the strata are very porous with spring rising, a wall of concrete should be extended up the inner face of the trench as a protection to the puddle. Water must in no case be in direct contact with the puddle.

Fig 23

Springs should be carefully dealt with when found within the area of the embankment, and should be conveyed by means of concrete channels of sufficient capacity to the outside of the embankment.

The whole of the soil and earthy materials as well as stumps and vegetation should be cleared off the site of the embankment, and no vegetable earth should be used in

Fig 24

its construction. The materials used in the inner portion should consist of fine clayey or other adhesive earth with a small proportion of stones or ballast, the outer portion consisting mainly of dry, hard, and stony materials. On either side of the puddle-wall a width of selected clayey material is formed for the purpose of keeping the puddle moist, and to assist in its protection. The whole of the material should be deposited in layers of from 9 in. to 2 ft. in thickness, curving or dipping towards the puddle-wall on either side. In some cases a bed of puddle is carried from the wall under the base of the inner slope and continued up the slope, sufficiently protected with selected material. The object of this is to render the inner bank impermeable (fig. 25).

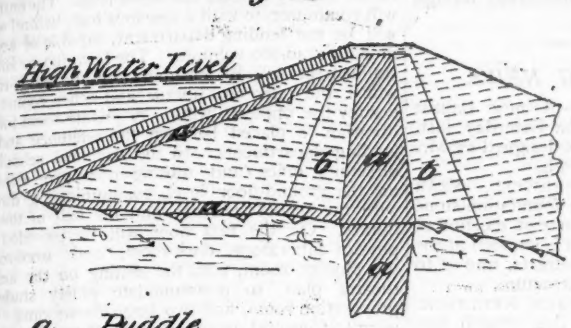
In excavating within the reservoir area for the purpose of providing material for the construction of the embankment, or with a view to increasing the capacity of the reservoir, care must be taken not to remove an impervious covering over pervious strata, and thus create a difficulty which it should be the main object to avoid.

The inner slope should be protected with stone pitching over the entire area of the made embankment after it has become consolidated, the toe of this pitching being embedded in a concrete footing. The solid slopes, when of a clayey nature, are also usually pitched with stone for a vertical height of 3 ft. above and at least 5 ft. below the high-water line, as a protection from the wash of the waves, and as a preventive against the growth of vegetation in the shallow water, as well as against discoloration from the dissolved clayey matter.

In cases where a reservoir is constructed practically on a tableland and embanked all round, sufficient material is excavated from the interior to form the embankments and provide the requisite capacity. The methods of construction are in every way similar to the foregoing.

There are two indispensable accessories to an impounding reservoir, viz., the outlet and over-

Fig 25



a – Puddle
b – Selected Material

Fig 26

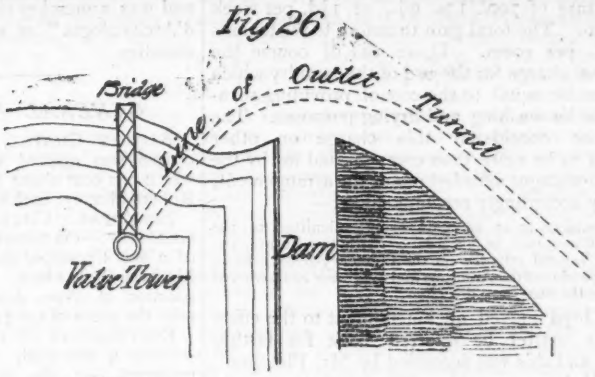
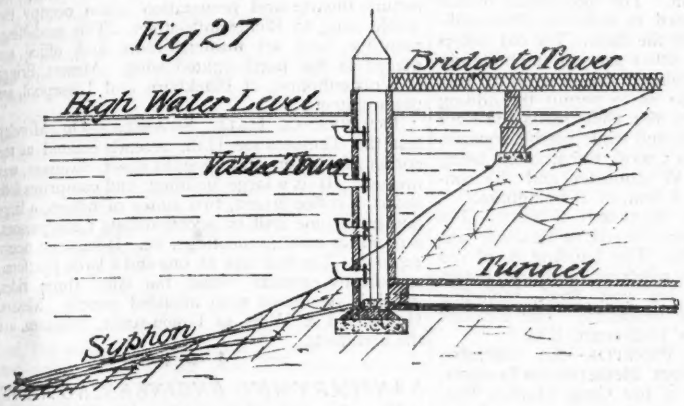


Fig 27



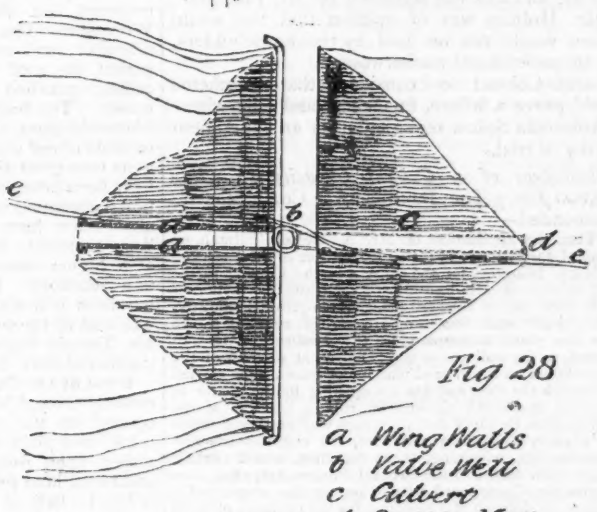
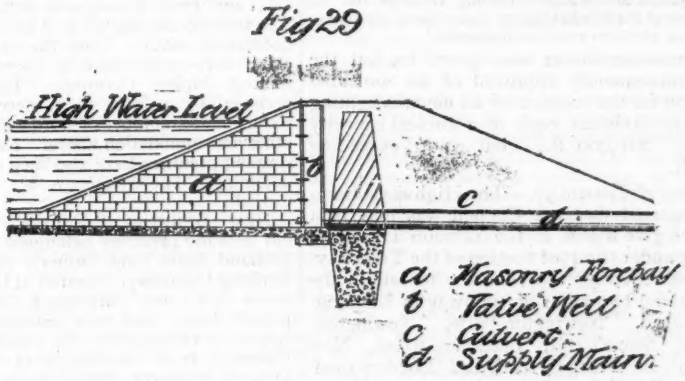


Fig 28

a Wing Walls
b Valve Well
c Culvert
d Supply Main
e Course of Stream

Fig 29



a Masonry Forebay
b Valve Well
c Culvert
d Supply Main

flow weir, over which many difficulties have arisen and through which many disasters have occurred.

The outlet arrangements are carried out in several ways, according to the special circumstances of each case. The method of carrying the outlet pipes through the deep portion of the made embankment has been rarely followed, and is only permissible in shallow reservoirs. The terrible disaster in 1864 at the Bradfield or Dale Dyke Reservoir, near Sheffield, when 250 lives were lost, resulted from this practice. In reservoirs not exceeding 25 ft. in depth a syphon (the action of which has already been explained) is the most economical and efficient as well as the safest method of drawing the water off. It does not interfere in any way with the embankment below the high-water line, and the same method has been recommended by Sir Robert Rawlinson for drawing off the lower water from large reservoirs (fig. 26). This obviates the necessity of carrying the tunnel outlet at so low a level. The advantages of doing so are less interference with the strata at great depths and economy in construction. The system generally adopted in large reservoirs is to cut a trench or drive a heading through the solid rock at one end of the embankment, and construct a stone, brick, or concrete and iron culvert with a valve tower in the reservoir (fig. 27). The base of the tower is below the deepest portion of the reservoir, unless a syphon is adopted and arranged to draw off the water at different levels. The water is discharged through the supply main laid within the culvert. The advantage of this system is the facility with which any of the working parts can be examined and repaired without interfering with the embankment or being in any way a source of weakness to it. The question whether it is preferable to drive a heading or cut an open trench for the culvert depends upon the nature of the rock, apart from economical reasons. Where the rock is solid and compact a heading is preferable in most cases, but where the rock is fissured and contains many "backs," an open trench which is filled in as the culvert progresses is frequently the better course. This is due to the considerable difficulty attendant upon consolidating around the culvert in a timbered heading in fissured ground. In cases where it is necessary to cross the puddle-trench at a higher level than the bottom of the trench, the culvert should be supported on a concrete pier brought up from the solid rock.

The method represented by figs. 28 and 29, is not a system to be recommended. Here the outlet is placed in the deepest part of the embankment, and consists of a masonry forebay, supported by iron struts, and a draw-off well and tunnel, also in masonry. The tunnel is supported on a concrete pier (with or without slip joints), where it crosses the puddle-trench. This system is objectionable from the fact that many of these tunnels have been distorted or cracked, frequently developing leaks. Such structures in all probability constitute an element of weakness where the greatest strength is required.

THE LONDON COUNTY COUNCIL.

THE usual weekly meetings of the London County Council, were resumed on Tuesday last, after the summer recess, in the County Hall, Spring Gardens, Sir John Hutton, Chairman, presiding.

Central Laundry, Boundary-street Scheme.—The Public Health and Housing Committee reported that they had had under consideration the provision that should be made for washing and drying the tenants' clothes on the Boundary-street area. The practice hitherto adopted in the Council's buildings as well as in the various dwellings erected by the Artisans' Dwellings Companies has been to provide washhouses either on each floor of the tenements or on the roof, and any arrangements by which tenants were enabled to do the washing at home has doubtless its advantages. From inquiries they had made the committee gathered that tenants experienced considerable difficulty in drying their clothes satisfactorily on the roofs of the dwellings, in consequence of the fact that the clothes when washed were soiled by the impurities with which the air was charged. It was also apparent that considerable inconvenience and physical injury attended the practice of clothes drying in the tenants' rooms. Having regard to these circumstances, the Committee were of opinion that, in lieu of any provision for washing and drying in the tenements, a common laundry placed in as central a spot on the area as possible was preferable. From the evidence that had been put before them on the subject it appeared that laundries where mechanical means of washing and drying were provided were generally very successful as regarded their practical result. The architect had submitted a plan of the proposed building, which provided for a waiting room, a laundry proper with forty-two washing stalls, each stall having a washing compartment with hot and cold water supplied and a boiling compartment fed by steam. At the end of each range a hydro-extractor would be provided for wringing, and a mangle driven by steam, and at the end of the building there would be a range of 42 drying-horses for drying with hot air. The clothes after drying would be taken to the ironing room. Four baths for women were provided, approached from the laundry, and twelve baths for men in an annexe to the laundry building. The site proposed lay to the west of Turville-street on the south side of Charlotte-buildings, and was well within five minutes' walk of the farthest dwellings on the area. The committee had carefully considered the question of the cost of the central laundry as against the cost of laundries in the dwelings, and they had prepared a statement of capital expenditure, together with the estimated outgoings and receipts based on the assumption that the bulk of the tenants would, as it is obvious they must, make full use of the accomodation provided. From this statement it appeared that an annual deficiency of 392*l.* 18s. 3d. was anticipated, which represented an additional rent of ¾d. per week per room. As a set-off against this extra charge, it was estimated that by abandoning the laundries in the dwellings a capital outlay of 13,125*l.* would be saved, equivalent to a saving of an annual

expenditure of 700*l.* 13s. 9d., or 1¼d. per week per room. The total gain therefore to the tenants was ½d. per room. There was of course the additional charge for the use of the laundry which could not be equal to the cost of providing separate fires for washing and drying purposes. The committee considered this charge on other accounts to be more than compensated for by the many advantages afforded under the arrangement, and they accordingly recommended :—

That, subject to an estimate being submitted to the Finance Committee in accordance with the statute, the plan of a central laundry on the Boundary-street area be approved, and that the Architect and Engineer be instructed to prepare the necessary drawings.

Mr. Lloyd moved an amendment to the effect that the matter be referred back for further inquiry, and this was seconded by Mr. Fletcher.

Mr. Holmes was of opinion that the wash-houses would not be used by the householders, but by professional washerwomen.

Lieut.-Colonel Ford considered that the scheme would prove a failure, financially and otherwise.

Alderman Spicer regarded it as an experiment worthy of trial.

Buildings of a Cubical Capacity exceeding 216,000 feet.—The Building Act Committee recommended—

"That the application of Mr. A. Hessell Tiltman, on behalf of the Electric Lighting Committee of the Vestry of St. Mary, Islington, for the consent of the Council to the erection of an electric lighting station at the rear of houses on the west side of Burnard-place, Eden-grove, Holloway, with divisions each exceeding 216,000 feet cube, as shown upon the plans accompanying the application, be not granted, as the wall across the gangway at the rear of the engine-house on the ground plan is not shown to be carried up through the roof, and has an opening in the centre in excess of the width allowed by rule 3, sect. 28 of the Metropolitan Building Act, 1855, such wall not being therefore a party-wall under that Act, the engine-house and gangway, &c., adjoining, taken together, would contain 468,988 cubic feet, and the General Powers Act, 1890, does not give the Council authority to permit the erection of a building, or division of a building, for the purposes of trade or manufacture which would exceed 450,000 feet cube; it is also deemed undesirable to permit the enclosure of the ends of the engine and boiler houses with iron as proposed, as in the opinion of the Superintending Architect and the Chief Officer of the Fire Brigade the risk of fire extending to the adjoining premises would be increased."

The recommendation was agreed to, but the Council subsequently approved of an amended application for the erection of an electric lighting station with divisions each of a cubical capacity exceeding 216,000 ft., but not exceeding 450,000 ft.

Purchase of Tramways.—The Highways' Committee reported that the Council was now in a position to give notice to the London Tramways Company under the 43rd Section of the Tramways Act, 1870, requiring the company to sell to the Council about two miles of tramway in Kennington-park-road, Newington-butts, Newington-causeway, Stone's-end, Blackman-street, New Kent-road, St. George's-road, and London-road. The Council had in two previous cases affirmed the principle of the acquisition of tramways under the powers conferred by the general Tramways Act of 1870; and as the Committee were of opinion that the purchase of the tramways above mentioned could be effected without loss to the ratepayers, and that the transfer of ownership to the Council would be a public benefit, they recommended accordingly. The recommendation was adopted.

Southern Approach to the Tower Bridge.—Dr. G. J. Cooper moved—"That it be referred to the Improvements' Committee to consider and report to the Council at the earliest possible moment, before again bringing up a scheme for a southern approach to the Tower Bridge, whether the lines of route taken by the vehicular traffic passing over the bridge do not demonstrate that the public advantage will be much better served by abandoning the approach hitherto advocated by the Council, and making one approach directly communicating with the centre of the Borough, and another to intersect the Old Kent-road, near to the Trafalgar and Albany-roads."

Mr. Costelloe seconded the motion, but after some discussion, the consideration of the subject was postponed.

After transacting other business the Council adjourned about half-past six o'clock.

OBITUARY.

We have to record the death of the Italian archæologist Gian Battista de Rossi. He was born at Rome in 1822, and educated in that city. He first occupied himself with Christian Inscriptions of the first century and was thereby led on to a thorough investigation of the catacombs, his book on this subject, *Roma sotteranea Cristiana*, bringing him a wide celebrity. He filled a professorship at the University of Rome, and was a member of the "Pontificia Academia d'Archæologia" as well as of numerous foreign societies.

GENERAL BUILDING NEWS.

Baptist Chapel, Peebles.—A new Baptist chapel was opened at Peebles on Saturday last, which has cost about 400*l.*; it was designed by Mr. Robert Murray, architect, Edinburgh.

Episcopal Church, Motherwell, near Glasgow.—On Saturday last the foundation-stone of a new Episcopal church in course of erection at Motherwell was laid. The church is situated at the junction of Avon- and Crawford-streets, and is to take the place of the present iron structure.

Restoration of Parish Church, Redditch.—After a thorough restoration this church was reopened on the 26th ult. by the Bishop of Worcester. The interior especially has been considerably renovated. The old rafters which supported the roof have given place to an arched ceiling, panelled, and decorated with ornamental bosses. The body of the church has been laid with Mansfield stone, and the remainder of the flooring consists of red wood blocks. The chancel has undergone very great alteration. The intervening arches have been brought forward in order to allow additional accommodation for the choir. The old rafters above have here, as in other parts of the building, been removed, and replaced by a groined roof at a higher elevation, so as to permit the adding of a clearstory. Between the choir stalls the floor has been laid with black and white marble squares. The cost of the work was 5,000*l.*, the architect being Mr. Temple Moore, of Westminster, and the contractors Messrs. Brazier & Son, of Birmingham.

Wesleyan Church, Seaford, Sussex.—The recently-erected Wesleyan Church, at Seaford, was opened on the 26th ult. The building is of red brick, with plain Gothic windows, and has a varnished open roof. It has cost 860*l.*, including additional land for future extension. The architect is Mr. C. Bell, of Salters' Hall-court, E.C.

Business Premises, Penrith.—An extensive pile of buildings, for Messrs. Hetherington Brothers, has just been completed in the Corn Market, Penrith, and fitted throughout with the electric light. The front to the market is of red stone, with suitable decorative details. Over the entrance appears an elaborately-carved head in Aberdeen granite, representing Jupiter Olympus. The ground-floor is occupied by a large shop, over which are show-rooms, and a number of store and work-rooms, with other accommodation above. Factory, storage, and stabling premises have also been erected in the yard adjoining. The architect is Mr. H. Higginson, of Carlisle.

New Banking Premises, Coventry.—The old banking premises belonging to the London and Midland Bank (and formerly the Coventry Union Banking Company), situated at the corner of High-street and Little Park-street, Coventry, have been pulled down, and new premises are now in the course of erection by Mr. Charles Haywood, jun., Coventry, from the designs of Mr. Frank Barlow Osborn, architect, Birmingham. The new buildings, which will be in the Elizabethan style of architecture, will comprise, in addition to the banking premises, a suite of let-off offices situated on the ground floor in Little Park-street, and a bank manager's residence on the first and upper floors. The banking-room, which will be 40 ft. long and 34 ft. wide, is arranged to accommodate twenty-six clerks. The internal fittings will be in polished walnut. The strong-rooms are situated in the basement, a hydraulic lift being provided, communicating with the banking-room over. The remaining portion of the basement will be appropriated to the use of store-rooms, lavatory, heating-chamber, &c., the whole being rendered fireproof. The building will be carried out in white Hollington stone and red bricks, and roofed with tiles; it is expected to be completed by August next.

Wesleyan Chapel, Corby Hill, Cumberland.—The foundation-stones of a Wesleyan Methodist Chapel at Corby Hill were laid on the 27th ult. The edifice will be of brick, and is estimated to cost 300*l.*

Free Church, Gretna.—The new Free Church which is being erected at Gretna, from designs by Mr. T. Taylor Scott, architect, of Carlisle, will cost about 500*l.* The building will be oblong in shape, and of Gothic or simple Early English type. Externally the walls will be of red Corsehill stone, and the structure will be lighted with four two-light windows on each side and wheel windows at the gable ends, whilst the porch will have two single-light windows, one at each side. The floor will be tiled with red and black quarries.

The Gamble Institute, St. Helen's, Lancashire.—On Tuesday last the foundation-stone of the extensive pile of buildings to be known as the Gamble Institute, St. Helen's, was laid. The *Daily Graphic* states that the building, which is to be used for purposes connected with a Free Library and Technical Schools, will occupy one of the most commanding sites in the borough, and will present a handsome frontage to Corporation-, Hardshaw-, and Bickerstaffe-streets. It will be faced with pressed bricks and red terra-cotta on a granite sub-basement, and will be in the Victorian style. The free library will occupy the whole of the ground floor, and will be raised about 7 ft. from the street level. The entrance will communicate with a spacious hall, behind which will be the lending department, capable of accommodating 40,000 volumes. The frontage to Bickerstaffe-street will be occupied by the news-room, whilst the reference library and other rooms will occupy the opposite wing. A private room for the librarian is placed between the reference and the lending departments. In the technical school the director's office and waiting-room are arranged on the ground-floor level, communicating directly with the school staircase, and the hall of the free library. On the first floor will be provided the physics laboratory, dark-room, and store-room; the physics room, with the seating on the amphitheatre plan, to accommodate ninety students; preparation room, and two large class-rooms. The wing to Corporation-street on this floor will embrace students' common room, two large class-rooms, and the geometrical-drawing room. On this floor will also be placed the cookery and laundry departments, which are so designed that the whole area can be used as one room for demonstrations. The second floor will be devoted to the chemical and art departments, the chemical laboratory for sixty students, balance and combustion rooms; the lecture theatre and preparation room occupy the whole wing to Bickerstaffe-street. The modelling, painting, and art masters' room and office are placed in the north-lighted wing. Messrs. Briggs & Wolstenholme, of Blackburn and Liverpool, are the architects.

Temperance Hall, Swansea.—On Monday last the Temperance Hall, recently erected at the corner of Gower- and Orchard-street, Swansea, was opened. It is a large building, and comprises four shops, a coffee tavern, two suites of offices, a large and handsome hall to accommodate 1,400 persons, a room for smaller meetings, &c. It has cost nearly 10,000*l.*. The hall has at one end a large platform, a balcony extends round the other three sides, which is decorated with moulded panels. Messrs. Hannaford & Wills, of Union-street, Swansea, are the architects.

SANITARY AND ENGINEERING NEWS.

New Bridge, Kingussie, N.B.—The foundation-stone of the new bridge in course of construction over the river Spey, at Kingussie, was laid on Friday, the 28th ult. The piers are completed and the erection of the super-structure will be proceeded with at once. The bridge was designed by the Badenoch District Surveyor, Mr. Mackenzie, C.E.; and the contractors are Messrs. Sommerville, Dalmuir Iron Works, Glasgow; and the sub-contractors Messrs. Paton, Glasgow, and Mr. James Macdonald, builder, Kingussie.

Progress of Electric Lighting in Leeds.—Additional plant is now being laid down in the Yorkshire House-to-House Electricity Company's Station, Whitehall-road, Leeds, to meet the increased demand for the electric light in that city, and the engine-house, &c., has been considerably extended. The new plant comprises three additional Lancashire boilers, each 30 ft. by 8 ft., and capable of working up to 140 lbs. pressure; three horizontal condensing engines, each of 400 i.h.p., and three 200-kilowatt alternating current dynamos. With the 600 i.h.p. now in operation, the capacity is thus being raised to 1,800 i.h.p. This is a large producing power. It is stated that, excepting Liverpool, no town or city in the English provinces is known to possess a central electric lighting station equipped with such powerful engines. It is anticipated that the Town Hall and municipal buildings will shortly be lighted from this source.

Manchester Ship Canal: Opening of Walton Lock.—The Walton lock, which gives access to the Ship Canal from the river Mersey at Warrington, was formally opened on Monday last, October 1. The new lock is 229 ft. in length and 30 ft. wide, and will contain 10 ft. 6 in. of water at low water. On the south side there is a 20 ft. sluice for flushing purposes. It has been in process of construction since last November.

Opening of the Uppingham and Seaton Railway.—The new railway from Uppingham to Seaton, on the London and North-Western Railway, was opened on Monday last for passenger traffic. The work was commenced in November, 1892; and the *Leeds Mercury* states that during its construction several landslips occurred, one or two of them very serious, which have cost nearly half the total sum expended on the line. On leaving Seaton station the new railroad goes in the direction of Stamford for about three-quarters of a mile before the Uppingham junction is reached, and then branches off to the left. There is a rise of 16 ft. from Seaton station to the junction, but from that point the line falls down a gradient of one in sixty-six, in order to pass under the viaduct of the Midland Railway from Manton to Kettering. This is the lowest point on the line, the station at Uppingham being 212 ft. above it. The altitude of the town has caused great difficulty in the making of railway communication, and in one case a long viaduct has been built. The length of the new line is between three and four miles. The total cost of construction was 30,000*l.*, apart from the purchase of the land. The contractors were Messrs. W. Radcliffe & Co., of Huddersfield; the ironwork contractors, Messrs.

Butler & Co., of Leeds; and the resident engineer was Mr. H. M. Denham, of Uppingham.

THE WATER FAMINE IN LEICESTER.—In view of the scarcity of water at Leicester, a subject already alluded to in our columns (see *ante*, page 228), the Corporation officials are putting forth every effort, says the *Leicester Advertiser*, to secure additional supplies. Only a very small and rapidly-diminishing stock now remains in the reservoirs at Bradgate and Thornton. Under the directions of the engineer, a shaft ten feet square has been sunk on the Bede-house meadows, and water was found at a depth of 8 ft. It is anticipated that a considerable supply will be available from this source when a greater depth is attained. The water, which is of average quality, is being pumped direct into the mains under pressure. Negotiations for sinking wells in other districts near are also in progress. The rain which fell last week is a drop in the ocean compared with what is necessary before the anxieties of the water committee can to any extent be relieved.

STAINED GLASS AND DECORATION.

MEMORIAL FONT, VERWOOD, DORSET.—An elaborate font placed in Verwood parish church was dedicated on Saturday last. In form it is octagonal, and is of veined and polished marble, with quatre-foiled columns of Devon marble. In cinquefoiled recessed panels on each cant of the bowl are shields, upon which are carved representations of the emblems of the Passion. On the bevelled edge of the bowl is an inscription in raised and bevelled letters. The high cover is made of oak. Like the new chancel and the font itself, it is in the Early English style. In the lower part are eight recessed and groined niches, each occupied by statuettes of angels alternately in attitudes of devotion and with musical instruments. The niches are gabled, and ornamented by carving and crocketted work. The spiral part of the cover is enriched by traceried and carved panels, and the whole terminates with a carved finial. The cover is lifted by a mechanical arrangement from the roof, in wrought iron. When raised, the panelling underneath is seen to have carved thereon a projecting and descending dove. The work has been designed by Messrs. Adye & Adye, architects, of Bradford-on-Avon, and has been executed by Messrs. Harry Hems & Sons, of Exeter.

OAK STALLS, ALL SAINTS' CHURCH, OKEHAMPTON.—We learn that new and elaborately-carved oak stalls have recently been fixed in this church.

REREDOS, PARISH CHURCH, MELKSHAM.—On Saturday last an elaborately-sculptured reredos was unveiled in this church. The super-altar is of massive richly-veined and polished Staffordshire alabaster, the statues and groups of sculpture are of pure white Castellino "marble," and the new fabric generally is of Painswick stone. The style chosen is freely-treated fifteenth-century English Gothic. Carried up from the floor, light tracery work occupies either side of the altar itself. The slab forming the super-altar is richly carved. Above, the reredos proper is divided into three recessed compartments—the middle one being the largest. Between them are double buttresses, terminating in crocketted pinnacles. The flanking piers are octagonal in plan, each having a pinnacle shaft springing from its inner side. These are surmounted by sculptured figures of angels. The triplet of sculptured groups form the especial features of the design. The central panel shows the stable with the Holy Family. In the north panel is a group representing the magi in adoration, the shepherds being represented in the south panel. The whole was designed by Mr. Chas. E. Ponting, architect and Diocesan Surveyor, of Lockeridge, Marlborough, and executed by Messrs. Harry Hems & Sons, of Exeter.

STAINED GLASS WINDOWS, HASTINGS.—The Church of St. Matthew, Silverhill, Hastings, has been enriched by the addition of four new single-light stained glass windows. In the upper portion of each is the figure of an Apostle, and the lower parts depict scenes in the lives of Saints. They were unveiled on the 28th ult.

FOREIGN AND COLONIAL.

FRANCE.—At the village of Maladrerie near Poissy, in a ruined chapel converted into a barn, have been discovered the remains of some fresco paintings which formed the decorations of the vault. They are almost completely ruined, but a few figures and the colouring can be distinguished here and there.——In excavating for the foundations of the Meissonier monument, a fragment of a very thick wall has been found, which is supposed to be part of the ancient residence of Saint Louis and Philippe-le-Bel.——The old church of Bougival, which has been in a dangerously dilapidated condition, and which is classed as a "historic monument," is undergoing a process of restoration.——The inauguration of the statue to Claude Bernard, the physiologist, took place at Lyons, on Friday, last week.——M. Mercié has presented to the city of Toulouse the plaster model of the "Belfort" group, of which he is the author.——M. Homolle, in charge of the French excavations at Delphi, announces that the excavations have yielded excellent results, and that M. Comte expects soon to be able to give a precise description of the arrangement of a Greek house of the second century.——At Bordeaux a large post-office and telegraph building is in course of construction from the designs of M. Boussard, architect of the new Post Office buildings in Paris. The Bordeaux building has aroused a great deal of criticism and objection on account of its eccentricity of style and the strong colour introduced in its ceramic ornament, which are considered to render it quite out of keeping with the sober and dignified style belonging to the generality of the public buildings of Bordeaux.——The Municipality of Rochelle have acquired a curious house of the Renaissance period, the frieze of which is decorated with the monogram of Diana of Poitiers, and which is known under the name of the "maison de Henri II."

GERMANY.—The Emperor has granted 1,250*l.* towards the restoration of the Church of Altenberg, about ten miles from Cologne, and an additional 500*l.* towards the renewal of the historical monuments it contains. The edifice was commenced in 1225, and consecrated in 1379.——The project for an Electric Overhead Railway at Berlin is at length in a fair way of being carried out, the Municipal Council having accepted the Siemens' proposals, adopted by the sub-committee, as mentioned in our issue of the 22nd ult. A start is to be made on the works early next spring.——More improvements are to be made in Berlin, with a view to the 1896 exhibition; a new bridge is to be built in continuation of the Wienerstrasse, at a cost of 15,000*l.*, and two more bridges are to be widened at a total cost of nearly 18,000*l.* An electric tramway over the new bridge at Treptow is also in contemplation.——Negotiations are pending as to the taking over of the Building Act Executive from the Government Police by the Municipality; at the same time a similar transfer of the Fire Service is unfortunately being considered.——The new tramway lines across the Opernplatz are now open for traffic.——The widow of the architect Hermann Wentzel has presented a sum of 25,000*l.* to the Berlin Academy of Sciences, to be followed by an aditional 50,000*l.* on her demise, the income arising from which is to be used, under the name of the "Elise Wentzel Foundation," for the furtherance of "any great scientific undertakings requiring large expenditure."——The *National Zeitung* learns that the Government will not re-introduce the Dortmund-Rhine Canal Bill this Session, but will recur to the project at a later date in connexion with the proposed "Mittelland" Canal.——Improvements are being made at the Shack Galleries at Munich under the direction of the architect Seidl.——Six tumuli have been opened on the Ebersberg, near Durkheim, under the direction of the local antiquarian society. The larger, exhibit stone vaulting, and contain funereal urns; from the accompanying finds it is concluded that they date from pre-Roman times.

DENMARK.—The question of erecting new Houses of Parliament in Copenhagen remains under consideration, but as yet no definite decision has been arrived at, although it is expected that, as the new Rigsdag is Conservative, and therefore more disposed towards the expenditure on such a needful building, a sum towards the preliminary work will be voted next session. Meanwhile, the authorities concerned are studying the designs and plans of the new Houses of Parliament in Stockholm, which were fully illustrated and described in the *Builder*, March 28, 1891.——Work on the new Copenhagen Town Hall is rapidly progressing, the more so as winter will soon put a stop to it. Contracts have just been signed for all iron girders and doors.——The wings of the Glyptothek, or Art Gallery, in Copenhagen have now been completed. The sculptor Hammeleff is now engaged in carving the reliefs in the pediment of the façade.——A large block of buildings for business purposes, which promises to be an ornament to "New" Copenhagen, is now in course of erection in the central part of the town. The architect is Herr Ingemann. Another large business mansion, just commenced, is the "Standard" Magazine, on the fashionable King's New Market. There will be a front and two long side wings, allowing of a large courtyard between. It is to be ready by the autumn of 1895. The architect is Herr Ch. A. Arentzen.——The new Royal Agricultural College in Copenhagen is now so far completed that a portion may be occupied. The entire structure will be ready by next spring, the total cost being 860,000 kr.——New official residences have also been completed at Vesterfælledvej Prison; likewise an asylum for old people, a red brick structure, named after the King and Queen of Denmark, and erected by public subscriptions in honour of their golden wedding. The cost has been 50,000 kr.; the architect is Herr Ludvig Knudsen.——Some five-and-twenty ornamental public telephone kiosks are in course of erection in Copenhagen. They are constructed of wood and glass, and fitted with a four-faced clock and the electric light.——A committee has been formed in Copenhagen for the erection of an imposing monument in honour of Niels Gade, the composer. The committee had invited designs from the well-known sculptors Bissen and Sinding, and the jury has awarded the prize to the former. The statue, which represents the composer in the attitude of leading an orchestra, is to be of bronze, and will be mounted in the Square of St. Anne, close to the Concert Palace. It is to be ready in 1896.——An interesting restoration is now in progress in Copenhagen, and will be completed next year, viz., that of the chapel of the ancient historical Church of the Holy Ghost (Helligaandskirke). The edifice is to be restored exactly according to its original state and appearance. Thus all the ochre-coloured brickwork of a later date is being removed and replaced by imitation red "Monk" stone, as in the original structure, the roof relaid with red tiles, &c. In the interior all the plasterwork covering the fine, arched ceiling is being removed, and also the plaster coating around the four heavy square pillars supporting the work. The latter are constructed of hexagonal blocks, and ornamented with capitals and plinths.——Another ancient edifice has been restored by Professor Storck, the "Cloister Church" in Horsens. The architect has issued a report of the work.——A third interesting ecclesiastic edifice which has been restored is Storehedinge Church, in Stevns, on the Jutland coast. This is one of the oldest in Denmark, and its plan is curious, being octagonal, with a tower at each end. It is maintained that its design was imitated from the "Dom" of Aix-la-Chapelle.

ITALY.—The Shelley Memorial at Viareggio, which has already been referred to in these columns, was unveiled last Sunday by Signor Riccioni, the president of the memorial committee. The monument is the work of Professor Urbano Lucchesi, the author of the Victor Emmanuel Monument at Spoleto, and consists of a bust of the poet on a marble pedestal, the total height being 15 ft. The necessary funds were collected by public subscription.——The Government, in answer to the recent note of the Swiss Ambassador to Rome, has expressed its acquiescence in the proposed Simplon tunnel plan, and its willingness to establish the southern approach lines, but will undertake nothing as far as the financing of the project is concerned.

MISCELLANEOUS.

SYKES' INTERCEPTOR.—In regard to this trap, which was noticed and illustrated on page 196 *ante*, we find on an inspection of the actual trap that the two inspection branches are not really so close together as represented on the drawing issued by the manufacturers, who have thus done their own work an injustice. The plugs to the inspection openings are driven tight by a screw formed with a hard composition similar to that used in the Albion Company's drain-pipe joint, previously noticed and illustrated in our columns.

HOLBORN RESTAURANT: DINNER TO WORKMEN.—A complimentary dinner was given on Saturday evening last, by the proprietors of the Holborn Restaurant, to the workmen employed in the construction of the new western annexe. The proprietors have long kept in sight the circumstance that they are frequently called upon to provide accommodation for dinner-parties, balls, and other social functions, at which the assembled company would be very numerous, and they have added the new block of buildings, comprising the spacious King's Hall, with the Council or Reception room, and the necessary cloak and dressing room accommodation. The King's Hall can seat upwards of 500 diners, while another 100 guests may be easily accommodated in its upper balcony. The elevated orchestra, accommodating 60 or 70 musicians, is situated at the eastern end, while at the western end there are three distinct apartments overlooking the hall, from which the friends of guests may witness the proceedings. The western annexe has been erected from the designs of Mr. T. E. Collcutt, the contractors being Messrs. Holland & Hannen. The marble work has been carried out by Messrs. Burke & Co.; the constructive steel and iron work by Messrs. Lindsay, Neal, & Co.; and the general decorations and stained glass by Messrs. Shrigley & Hunt. Messrs. Maple & Co. supplied the upholstering and furnishing work; while the plaster ceilings are by Messrs. Jackson & Sons, and the culinary fittings by Messrs. Benham & Son. The electrical installation has been designed and carried out by Messrs. Belshaw & Co.; and the wrought copper balustrading to the galleries surrounding the hall, as also the copper work to the grand staircase, is by Messrs. Potter & Sons. To celebrate the opening of this important addition to the premises, upwards of 600 of the workmen employed on its construction were entertained to an excellent dinner, presided over by Mr. T. E. Collcutt, who was supported by a large number of visitors. The health of the proprietors was proposed by the chairman, and acknowledged by Mr. F. Gordon, the other toasts being "The architect and builders," proposed by Mr. W. Negus, and responded to by the chairman, and that of "The visitors," proposed by the Rev. Benjamin Waugh, and replied to by Mr. W. H. Collingridge.

CASEMENT STAY-BARS AND FASTENERS.—Messrs. Baker & Sons, of Birmingham, send us an illustration sheet and specimens of their patent casement stay and fastener combined, for casement windows. By means of hinged joints the stay becomes also the handle to turn the fastener, being straightened for that purpose, and hanging vertically by the sash-frame when the window is closed. Another advantage claimed is that as the stay holds the middle of the window and not the bottom rail, there is less probability of the sash being strained in a blast of wind. The convenience of having fastener and stay in one is obvious, the only drawback being that the stay is rather conspicuous when the window is closed.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Chapel	St. Peter's Port Hospital, Guernsey	.....	Oct. 18
*Public Buildings	Sutton (Surrey) Lc. Bd.	50*l.* & 20*l.*	Nov. 27
*Museum for Antiquities, Cairo	Egyptian Government	First 600*l.* and 400*l.* between the next four	Mar. 1, '95

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Supply of Materials	Borough of Croydon	*Official*	Oct. 9
*Road Works	Lewisham Bd. of Wks.	do.	do.
*Broken Granite and Granite Spalls	Hackney Vestry	J. Lovegrove	Oct. 10
*Public Underground Convenience	do.	do.	do.
Offices, Outbuildings, &c. near Leeds	Rothwell Local Board	T. H. & W. E. Richardson	do.
Shed, &c. Cardigan Mills, Leeds	David Dixon, Son, & Bro.	F. W. Bedford	do.
House and Alterations to Chapel, Aberfan, Merthyr Vale	Rev. J. M. Davies	T. Roderick	do.
Cast-iron Pipes, Valves, &c.	Bedlington Local Bd.	W. W. Cooper	do.
Additions to Boyndlie House, Fraserburgh, N.B.	.....	Ellis & Wilson	do.
Twelve Cottages, Howth	North Dublin Union	*Official*	do.
Metalling, Paving, &c. Marion and other streets	Cardiff Corporation	do.	do.
Pipe Laying, Woodland, Ivybridge	Plympton R.S.A.	do.	Oct. 11
Pier, Campbelltown	Inverness C. C.	R. Black	do.
Iron and Steel Work, Foss Island	H. Leatham & Sons	W. G. Penty	do.
*Ambulance Station, Woolwich	Met. Asylums Board	T. W. Aldwinckle	do.
Restoration of Church, Clayport, Alnwick	.....	Geo. Reavell, jun.	do.
Residence, Woolacombe Bay, North Devon	.....	W. C. Oliver	do.
Cottage, Walls, Walls, Sewers, &c.	Youghal (Ireland) Joint Burial Board	Mr. Lynch	Oct. 12
Additions, &c. to Plume Hotel, Hungerford	F. Blatch	*Official*	do.
Pipe Sewers (1,000 yds.)	Seaford (Sussex) Local Board	B. A. Miller	Oct. 13
Alterations, &c. to Steward's House, Mount Coote, Kilmallock, Ireland	.....	E. A. Hackett	Oct. 14
Residence, New Barnet	.....	E. F. Taylor	Oct. 15
Additions, &c. to Schools, near Port Talbot, Glam.	Margam School Board	Lambert & Rees	do.
Iron Footbridge, Lambeg	G. N. R. Co. (Ireland)	W. H. Mills	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
School Enlargement, Gerar-street	Derby School Board	J. S. Story	Oct. 15
Twenty-one Dwelling-houses, Harriet-street, Brighouse, Yorks	Brighouse Dist. Indus. Soc. Lim.	Sharp & Waller	do.
Rustic Bridge, Roath Park	Cardiff Corporation	W. Harpur	do.
Pipe Tracks and Laying	Be'ness (N.B.) Town Commrs.	*Official*	do.
Sewer Works, Littleton-street, &c.	Walsall Corporation	do.	Oct. 16
*Granite, Gravel, & Hoggin	Barnet Local Board	do.	do.
*Waterworks	Wakefield Corp.	H. Rofe	do.
Sewerage Works, Skegby	Mansfield U.R.S.A.	H. Walker	Oct. 17
*Fire Station	Birkenhead Corp.	C. Brownridge	Oct. 18
Pipe Sewers	Thornton (Yorks.) L. B.	Jno. Drake	do.
Granite Road Metal (600 tons)	Bishop Stortford L. Bd.	*Official*	Oct. 20
Sanitary Pipes	Burnley U.R.S.A.	do.	do.
Sewerage Works	do.	S. Edmondson	do.
Banking Premises, Drogheda	Munster & Leinster Bank, Ltd.	W. G. Doolin	do.
*School Buildings, Forest Gate	West Ham Sch. Bd.	Newman & Jaques	Oct. 23
*Doctor's House and Nurses' Quarters	Chelsea Guardians	Landsell & Harrison	do.
*School, New Brompton	Gillingham and Grange U.D. School Board	Nash & Son	Oct. 24
Church, New Ross, Wexford	Canon Kavanagh	W. G. Doolin	Oct. 30
*Completion of Well and Borehole at Workhouse	Hackney Union	*Official*	do.
Church, St. Andrews, Cardiff	.....	John W. Rodger	Oct. 31
*Church on Asylum Estate, Charminster	Dorset Lunatic Asylum Committee	G. T. Hine	do.
Grit Setts (500 tons)	Manchester Corp.	*Official*	No date
Dining Hall, Kitchens, &c. Aintree, Liverpool	W. P. Hartley	F. W. Dixon	do.
Clothing Factory, Offices, &c. Store-street, Manchester	Hammond & Co.	H. A. Cheers	do.
Cottage, Stables, &c. Llanishen, Wales	Miss Thompson	E. Seward	do.
Residence, Princes-road, Windermere	.....	Stephen Shaw	do.
Residence, Blaenavon, Wales	.....	E. Blewitt	do.
Twenty Cottages, Tadcaster	.....	Bromet & Thorman	do.
*Semi-detached Houses, Northwood	.....	.....	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
Clerk of Works	Cardiff Union Gdns.	2*l.* 10s. per week	Oct. 9
*General Foreman	Cent. Lond. Sch. Dist.	2*l.* 15s.	Oct. 12
*Assistant Borough Surveyor	Walsall Corporation	160*l.*	Oct. 15
*Surveyor	Rugby U.S.A.	250*l.*	Oct. 17

Those marked with an asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv., vi., *and* viii. *Public Appointments, pp.* xx. *and* xxii.

SANITARY INSPECTORS' ASSOCIATION. — This association has arranged a course of lectures to be given at St. James' Hall, Piccadilly, by well-known professors and lecturers, commencing early in this month, in which a prominent feature will be made of that difficult question, the prevention of nuisance from smoke, which is one of the new duties the amended law has given the Metropolitan Sanitary Officers. Modern drainage in all its important details, bacteriology, and physiology are also to be dealt with.

THE FORTHCOMING IRON AND STEEL CONFERENCE IN GLASGOW.—A meeting of representatives of the Scottish iron and steel industries was held on Monday last in the Glasgow offices of Mr. William Jacks, M.P., and under the presidency of that gentleman, for the purpose of considering arrangements to be made on the occasion of a conference of the iron and steel trades of the West of Scotland to be held on the 30th inst. in Glasgow. It was arranged that the programme should include reports on foreign competition and the eight-hours' movement as affecting the iron and steel industries, and on the requirements of light railways for agricultural districts. On the same occasion Mr. William Jacks will deliver a presidential address, in which he will review the circumstances of the trade generally, and papers will be read on new sources of consumption for iron and steel, and the conditions that influence demand and supply in Eastern markets. Mr. Law, of Messrs. Jacks & Co., will read a paper on the recent course of the pig-iron industry of Scotland and the changes it has undergone. It is also expected that a paper will be presented on the effect of the Railway and Canal Traffic Act of 1888 on the iron trade, with special reference to the conditions of that industry in Scotland.—*Scotsman.*

UNIVERSITY COLLEGE LECTURES.—"Discoveries in Architecture" is the title of the Free Public Opening Lecture with which Professor Roger Smith resumes his classes at University College, London. This lecture will be delivered on the evening of Thursday, the 11th inst., and among the illustrations will be photographs, shown by the lantern, of some of the remarkable Greek sarcophagi, covered with rich sculpture and ornament which were found at Sidon, but are now transferred to the Museum at Constantinople. The Metropolitan Building Act. 1894, will form the principal subject of Professor Roger Smith's lectures to his class for Modern Practice during the session about to commence.

PLUMBERS' COMPANY: EXAMINATIONS.—At the meeting of the quarterly court of the Plumbers' Company, held on Saturday last at the Guildhall, a return was presented of the examinations held by the Company under their graded syllabus of practical and theoretical instruction for plumbers, showing that the examinations for the current year had been held at twenty-four centres in the United Kingdom, and that the passes in the preliminary grade of the examinations was 30 per cent. as compared with 49 per cent. in the previous year, and the passes in the intermediate examination were 30 per cent. as compared with 63 per cent. in 1893. A report from Norwich was received announcing the formation of a district council for the counties of Norfolk and Suffolk to deal with registration of plumbers in that district.

KING'S COLLEGE.—A lecture, illustrated by the oxy-hydrogen lantern, entitled "An Architect's Ramble amongst London Buildings," was delivered at King's College on Wednesday evening, by Professor Banister Fletcher, F.R.I.B.A. In introducing his subject the Professor said that many people took their tramps abroad unconscious of the beauties lying at their very doors. He wished, therefore, to show that London, even within the strict sphere of bricks and mortar, had ever fresh charm, and to endeavour to persuade his hearers that, if some fate were to decree that a man should be compelled to live in any one city, this City of London should be the place of his choice. He wished his audience to wake up to those architectural beauties which lay within their grasp, and to show that there was in London a wealth of architectural variety which every Londoner should at least make it his duty to become acquainted with. He assured them that they would find a sufficient repayment in the intellectual enjoyment and educational benefit which they would obtain for their research. Among the several kinds of antiquities, none were so much regarded as those of buildings, whether for magnificence, curious workmanship, or for the persons who had inhabited them. A district of one mile round St. Paul's would contain almost the whole of the ramble. Taking the Tower as the starting-point, the Professor took his audience past the Guildhall, the Mansion House, St. Paul's, to Piccadilly and Westminster, taking in also some buildings which were somewhat out of the line of route. The plan of the Tower of London showed what was the general disposition of a Norman castle, and the keep, or White Tower, which stands to-day in practically the same state as Gundulf left it in 1078. The celebrated Chapel of St. John was justly famous as a most perfect little specimen of Norman architecture. The exterior of the Guildhall bore no architectural importance, but the roof inside was an example of hammer-beam construction worth inspection. There was nothing striking about the design of the Mansion House, except as a phase of the later English Renaissance. The architectural detail of the Bank of England was beautifully executed, and some of the planning and distribution of the internal courts was like an architectural oasis in the desert to the weary architect or lover of art who passed through them during the day. The most noticeable feature in Cheapside was the fine steeple of St. Mary-le-Bow with which no modern steeple could compare, either for beauty and richness of outline, or the appropriateness with which classical details were applied to so novel a purpose. The General Post Office presented nothing of importance except in its firmness of parts and simplicity of treatment. St. Paul's, the *magnum opus* of Sir Christopher Wren, abounded in beauty of detail which in the lecturer's opinion was a perfect fountain of Renaissance detail. Passing Newgate, down Ludgate Hill by the Temple and the New Law Courts, they reached Somerset House whose predominant and rare characteristic was a grandeur of line possessed by few modern buildings. The grand staircase of the British Museum was, perhaps, of its kind the finest in Europe, but it was to its exhibition of sculpture that students would be particularly drawn. After touching the Albert Hall, Piccadilly Circus, and the buildings in Trafalgar-square, the Houses of Parliament and Westminster Abbey were reached. Many views of these structures both internal and external, were exhibited, the Professor explaining them somewhat in detail. Prior to the lecture the prizes were distributed by Mr. Niewann Smith, Master of the Worshipful Company of Carpenters, to the students of the Architecture and Building Construction Classes, and the Wood-carving Classes, at King's College, Great Titchfield-street, and Kensington. The principal winners were: Architecture and Building Construction, third year, H. Allberry, gold medal and 3*l.*; J. Davidson, bronze medal and 1*l.*; F. W. Rowe, silver medal and 4*l.*, and H. J. Triggs, bronze medal. In Wood-carving; E. R. Hind and L. Clarkson, bronze medal and one year's scholarship; A. South, bronze medal and one year's scholarship; J. A. Vogt, first prize certificate and 5*l.*; and W. Bowler, extra prize, 3*l.*; Arthur May, first prize certificate and 5*l.*; A. S. Randle, first prize, 5*l.*; James Osmond, second prize, 3*l.*; Wm. Aumonier, jnr., extra prize, 2*l.*; Chas. Redmond, first prize, 2*l.*; and F. Nutt (drawing), first prize, 3*l.*

CAPITAL AND LABOUR.

MASONS' DISPUTE, BRISTOL.—A sub-committee of the Bristol Master Builders' Association, and the local operatives *re* the masons' dispute at Tyndal

Chapel, have recommended the various parties interested to adopt the following resolution in lieu of an existing rule, viz. :—"Should a dispute at any time take place between any department of the building trade and their employers, or any question of disputed interpretation or infringement of these rules arise that cannot be mutually arranged between the parties affected, a Board of Conciliation shall be formed, composed of four employers and four members of the trade affected, to whom all questions shall be referred. The decision of the majority of such Board shall be binding on all parties concerned. That in case of an equal division, each body shall appoint an arbitrator, and the two arbitrators shall themselves, in case of disagreement, appoint an umpire. The decision of such arbitrators, if unanimous, or of the umpire, to be final, binding, and conclusive."

BUILDING INDUSTRIES FEDERATION, BRISTOL.—We understand that an association has been formed in the West of England called the "Bristol and District Building Industries Federation," and that a committee is now drawing up a final code of rules to be issued to various sections of the building trade.

MEETINGS.

SATURDAY, OCTOBER 6.

Junior Engineering Society.—Visit to "Gigantic Wheel" Works, Earl's Court Exhibition. 3.30 p.m.

MONDAY, OCTOBER 8.

Clerks of Works' Association.—Lecture by Mr. D. M. Nesbit, Carpenters' Hall. 8 p.m.

Liverpool Architectural Society.—Opening Address by the President. 6.30 p.m.

TUESDAY, OCTOBER 9.

Royal Society of Antiquaries of Ireland.—Fourth General Meeting, Society's House, Dublin. 4.30 p.m.

WEDNESDAY, OCTOBER 10.

Royal Society of Antiquaries of Ireland.—Visits to places of interest in Old Dublin.

FRIDAY, OCTOBER 12.

Architectural Association.—Opening Conversazione, Prince's Hall. 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

16,991.—SECURING SCAFFOLDING: *J. W. Sherino.*—Relates to a device for dispensing with rope lashings and such like fastenings. To a curved iron plate is secured a twisted linked chain. In the other end of the plate is an opening through which passes the hooked end of a rod which is screw-threaded, and provided with a tapped or winged handle so that the same can be screwed up or down. In operation the curved plate, which is provided on its under side with projecting teeth or spikes, is placed against the scaffold-poles where the two join or cross one another, and the chain is brought over and around the joint and one of the links placed over the hooked end of the rod, which is then screwed up.

19,943.—DRAIN-STOPPERS: *J. Jones.*—The special object is to temporarily stop a drain in order that it may be filled with water for the purpose of testing its soundness. The combination of mechanical means for this purpose is described in the specification.

20,151.—HAND-BRACE: *C. W. Entwistle.*—A tool specially designed for boring holes in corners or awkward places where the ordinary brace cannot be used. It is an ordinary screwdriver handle with a special brace socket for holding different bits, or tools.

5,626.—FIREPROOF FLOORS: *T. L. Banks.*—The floors are constructed with removable centreing and detachable ceiling bars, and have also intermediate suspension straps or rods, having their upper ends secured either to the concrete filling of the floor, or to arched sheet metal carried the joists.

8,110.—PILLAR W.C.: *A. & F. G. Johnson.*—The discharge-pipe terminates vertically near, or at the centre, instead of at the back, saving ground space. Provision is made for examining the pipe at intervals.

13,991.—SASHES: *W. Gibbin. jun.*—Relates to a new combination of worm wheels and screwed rod for opening and closing sashes, allowing them to be swung over on pivots for cleaning when necessary.

14,007.—RAILWAY CARRIAGE VENTILATOR: *L. B. Peters.*—A ventilator comprising a cap or hood enclosing one end of a ventilating tube or shaft provided with an annular opening and a shield or deflector to prevent the ingress and to drain off rain or moisture.

NEW APPLICATIONS FOR LETTERS PATENT.

SEPTEMBER 17.—17,613, E. Spinney, Duplex Pivot Hinge.—17,614, E. Spinney, Sliding Hinge.—17,621, W. Smith, Bricks or Building Blocks.—17,655, F. Orwin, Chimney Pots, &c.

SEPTEMBER 18.—17,689, J. Shelley, Door Spring.—17,697, A. Coleman, Window-sashes.—17,699, G. Harrison, Syphon Apparatus for Supplying Water to Water-closets, &c.—17,701, A. Lyster, Excavating and Dredging Apparatus.—17,704 F. Cawdell, Covering the Space between the Hinged Side of a Door and Door Frame.—17,747, F. Oliver, Paint.—17,748 and 17,749, H. Haddan, Clamp devices.—17,764, T. Temple, Self-acting Disinfecting Water-closet Pans and Hoppers.

SEPTEMBER 19.—17,797, J. Kennedy, Window-fastener.—17,847, F. Holloway, Construction of the Walls of Buildings, &c.

SEPTEMBER 20.—17,857, J. Goulson, Window Bolt.—17,865, W. Whitaker, jun., Tippers and Tipper-boxes of Waste Water-closets.—17,884, W. Ingham and B. Langton, Core and Spring for making Sockets in Sanitary Pipes.—17,900, W. Clark and A. Rammage, Fireproof Floo-ings.

SEPTEMBER 21.—17,929, D. Smith, Hinges for Doors.—17,936, J. Gillespie, Excavators, or Dredgers.—17,944, T. Trussell, Surveying Chain.—17,947, J. Ryder & Sons, Limited, and J. Ryder, Red Bricks, Terra-cotta Tiles, &c.—17,977, G. Barney and J. Clough, Door-knob Locks.—17,986, J. Macqueen, Excavating Tools.

SEPTEMBER 22.—18,038, L. Duncan, Window Opener.—18,040, B. Phillipson, Drain Connexions.—18,043, W. Davies, Raising, Lowering, and Fixing Window-sashes.—18,045, S. Watkins, Stoves and Ranges.

PROVISIONAL SPECIFICATIONS ACCEPTED.

15,369. J. Shaw, Automatic Down-draught Preventer for ventilators, chimney-tops, soil-pipes, &c.—15,863, W. Stead, Combined Grating-box and Door-trap for sewers, gulleys, cesspools, &c.—16 184, H. Tucker, Window-sash Fasteners.—16 185, W. Yates, Sash-fasteners.—16,261, W. Hemmings, Sash-fasteners.—16,266, W. Carter, Window-sash fasteners.—16,268, E. Blunden, Window-sash fastener.—16 312, A. Slater, Mortising or Routing Machines.—16,564, E. Clare, Fasteners for Sashes, Sliding-doors, &c.—16,593, A. Bruce, Heating Dwelling-houses, Halls, Churches, &c., by means of hot water.—16,602, C. Worssam, Gate-spring.—16,708, J. Roper, Device for holding pipes while joining same.—16,740, S. Bromley, Pressing Bricks.—16,917, G. Bullock, Window-sash fasteners.—16,988, M. Donne and C. Mathias, Self-closing doors, Shutters, &c.—17,148, E. Nowell and others, French Casements.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

20,515, F. Patterson, Water-closets.—13,671, R. Cussons, Binding together of Framework, or Windows, or other similar structures.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

SEPTEMBER 17.—By *Baker & Sons* (at Stamford-hill): Nos. 1*a*, 1, 3, 13, 27, 29, 31, 35 to 55 odd, 59 to 95 odd, and 18, 20, 22, 42 to 70 even, Grove-pk.-rd., Stamford-hill, u.t. 88 yrs., g.r. 329*l.*, 8,121*l.*

SEPTEMBER 19.—By *W. B. Hallett* (at Streatley): Streatley, Berks.—An enclosure of f. land, 9 a. 0 r. 24 p., 4,060*l.*; part of "Westfield Farm," 74 a. 2 r. 5 p., r. 50*l.*, 1,500*l.*; "Hogmore Island," 1 a. 0 r. 12 p., f., 620*l.*

SEPTEMBER 25.—By *Bean, Burnett, & Eldridge*: Bermondsey:—161, 163, St. James'-rd., u.t. 38 yrs., g.r. 7*l.*, 510*l.*; 266, Rolls-rd., u.t. 45 yrs., g.r. 5*l.*, 245*l.*; 1, 2, Ridge-st., u.t. 47 yr., g.r. 8*l.*, 455*l.*; 23, Willow-st., and 7, 8, Willow Grove, u.t. 29 yrs., g.r. 7*l.* 10s., 595*l.*; 25, Upper Grange-rd., u.t. 7 yrs., g.r. 26*l.*, 60*l.*; Peckham: 6, 7, Dayton Grove, u.t. 83 yrs., g.r. 12*l.*, 450*l.*

SEPTEMBER 26.—By *A. Booth*: 21, South Villas, Camden-sq., u.t. 28 yrs., g.r. 6*l.*, 395*l.* By *F. Jolly & Co.*: 8, 10, 16 to 26, even, Galway-st., St. Luke's, u.t. 31 yrs, g.r. 112*l.*, 1,000*l.*; 37, 39, Plumber's Row, Whitechapel, f., r. 93*l.* 12s., 850*l.*; 5a, 6a, Victoria-pl., Peckham, f., r. 36*l.* 8s., 300*l.* By *Orgill, Swan, & Orgill*: 106, Devonport-rd., Shepherd's Bush, f., r. 32*l.*, 450*l.*; 119, Godolphin-rd., f., r. 30*l.*, 415*l.*; 13, Westbourne Terrace-rd., Harrow-rd., "The Bridge House Hotel," u.t. 48 yrs., g.r. 20*l.*, r. 115*l.*, 2,210*l.* By *J. C. Platt* (at Hammersmith): 20, Rivercourt-rd., Hammersmith, f., r. 70*l.*, 1,150; 240, 242, 244, King-st., and Workshop, f., r. 260*l.*, 5,400*l.*

SEPTEMBER 27.—By *Tattersall & Co.*: 34, Humbolt-rd., Hammersmith, f., 550*l.*—By *Osborn & Mercer*: "Rookwoods" and 33 a. 3 r. 1 p., Castle Hedingham, Essex, f., 3,500*l.*—By *Fortescue & Co.*: F.g.r. of 72*l.* 2s. 8d., Dymock-st., Fulham, reversion in 84 yrs., 1,560*l.*; 5, 7, 9, Rashleigh-st., Wandsworth-rd., u.t. 73 yrs., g.r. 10*l.* 10s., 305*l.*; 18, Galveston-rd., Putney, u.t. 89 yrs., g.r. 7*l.*, 275*l.*; 17, 19, Applegarth-rd., Hammersmith, u.t. 71 yrs., g.r. 10*l.*, r. 78*l.*, 700*l.*; 2, Woodland Hill, Norwood, u.t. 64 yrs., g.r. 6*l.* 3s. 6d., r. 30*l.*, 240*l.*—By *Stimson & Sons*: 40, Wrotham-rd., Camden Town, u.t. 56 yrs., g.r. 5*l.*, 350*l.*; 48, Carlton-rd., Kentish Town, u.t. 56 yrs., g.r. 6*l.* 6s., r. 34*l.*, 260*l.*; 26, 28, 30, Lavender-rd., Battersea, u.t. 71 yrs., g.r. 15*l.*, 600*l.*; 21, 27, 31, Stormont-rd., Lavender Hill, u.t. 76 yrs., g.r. 22*l.* 10s., 800*l.*; 16, Marmion-rd., u.t. 76 yrs., g.r. 7*l.* 10s., 250*l.*; 29, 31, Neate-st., Camberwell, u.t. 18 yrs., g.r. 9*l.*, r. 64*l.*, 325*l.*: 190, 192, 194, St. George's-rd., Peckham, u.t. 69 yrs., g.r. 10*l.* 10s., 555*l.*; 75, Lewisham High-rd., New Cross, u.t. 35 yrs., g.r. 5*l.* 15s. 6d., r. 45*l.*, 300*l.*—By *Harman Bros.*: 15 to 21 odd, Woodgrange-rd., Forest Gate, u.t. 95 yrs., g.r. 64*l.*, r. 360*l.*, 5,520*l.*; 23, 29 to 35 odd, Woodgrange-rd., u.t. 95 yrs., g.r. 80*l.*, r. 470*l.*, 7,480*l.*; a plot of land in St. Stephen's-ter., South Lambeth, f. 50*l.*

SEPTEMBER 28.—By *Messrs. Aldridge*: "Kent Cottage," Dagnal Park, Selhurst, f., 565*l.*—By *E. Holsworth*: 18, 20, Rectory-rd., Stoke Newington, u.t. 45 yrs., g.r. 14*l.*, r. 94*l.* 10s., 775*l.*—By *A. Robertson*: 21, Denmark-st., Islington, u.t. 24 yrs., g.r. 6*l.*, r. 38*l.*, 170*l.*

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.		
ton	8/0/0	0/0/0
Teak, E.I. ..load	10/0/0	16/0/0
Sequoia, U.S.ft.cu	1 10	2/2
Ash, Canada load	3 0/0	4/5/0
Birch, do.....	2/15/0	4/0/0
Elm, do.	3/15/0	5/0/0
Fir, Dantsic, &c.	1/5/0	3/0/0
Oak, do.	2/10/0	4/10/0
Canada	5 15/0	7/5/0
Pine, Canada red	2/10/0	3/0/0
Do. Yellow	3/0/0	5/5/0
Lath, Dantsic, fath	4/10/0	5/10/0
St. Petersburg..	5/0/0	6/10/0
Wainscot, Riga, &c., log	2/15/0	5/0/0
Odessa, crown....	2/15/0	5/0/0
Deals, Finland 2nd & 1st std 100	7/10/0	9/10/0
Do. 4th & 3rd ..	7/0/0	8/10/0
Do. Riga	7/10/0	9/0/0
St. Petersburg, 1st yellow	10/0/0	13/0/0
Do. 2nd yellow	8/0/0	10, 0 0
Do. white.....	8/10/0	11/0/0
Swedish.....	7/10/0	16.0/0
White Sea.....	7/0/0	15/0/0
Canada, Pine 1st	22/10/0	27/0/0
Do. do. 2nd....	17/0/0	18/0/0
Do. do. 3rd, &c.	7/10/0	10/10/0
Do. Spruce, 1st	8/10/0	11/0/0
Do. do. 3rd & 2nd	6/10/0	7/10/0
New Brunswick	6/0/0	7/5/0
Battens, all kinds	3/0/0	15/0/0
Flooring boards, sq., 1 in. prep. 1st	0/9/6	0/14/6
Do. 2nd.....	0/7/0	0/11/6
Other qualities—	0/5/0	0/6/6
Cedar, Cuba .. ft.	/3½	/4½
Honduras, &c.	/3½	/4½
Mahogany, Cuba	/3½	/6
St. Domingo, cargo av.	/3	1/6
Mexican do. do,	/3	/4
Tobasco do. do.	/3½	/6
Honduras do. ..	/3½	/5½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio.....	7/0/0	18/0/0
Bahia	6/0/0	17/0/0
Satin, St. Domingo.....	0/0/5	0/1/0

TIMBER (*continued*).		
Satin, Porto Rico	0/0/6	0/1/6
Walnut, Italian ..	0/0/3½	0/0/7
METALS.		
Iron—Pig, in Scotland .....ton	2'2'10½	0/0/0
Bar, Welsh, in London	9/12 6	5'15/0
Do. do. at works in Wales.....	5/2/6	5/5/0
Do. Staffordshire, in London.....	6/0/0	6/10/0
COPPER—British cake and ingot	44/0/0	44/5/0
Best selected ..	44 5/0	45/15/0
Sheets, strong ..	52 10/0	53/0/0
Chili, bars	41/6 3	41/11/3
YELLOW METAL lb	0/0/4½	0/0/4½
LEAD—Pig, Spanish.....ton	9'16/3	0/0/0
English com. brands.....	9'17 6	10/0/0
Sheet, English, 6 lbs. per sq. ft. and upwards....	10''5'0	11 0 0
Pipe	11/15/0	0/0/0
ZINC—English sheet.....ton	18/10/0	19/0/0
Vieille Montagne	19/10/0	0/0/0
TIN—Straits.....	70/15/0	71/5/0
Australian.....	71 0 0	71/10/0
English Ingots..	74 10/0	75/0/0
Banca	73 10/0	74/0/0
Billiton	73/0/0	73 10/0
OILS.		
Linseed ..... ton	20/15/0	21/2/6
Cocoanut, Cochin	29/0/0	0/0/0
Do. Ceylon	24/10/0	0/0/0
Palm, Lagos.....	25/10/0	0/0/0
Rapeseed, English pale	21 10/0	0'0/0
Do. brown	20 0/0	0 0 0
Cottonseed ref....	20 5/0	21 5/0
Oleine.....	23/0/0	24/0/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/0/0	12/0/0
TAR—Stockholm barrel	0/10/0	0/0/0
Archangel.....	0/11.6	0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than 10 a.m. on Thursday.*]

BIRMINGHAM.—For the construction of sewers, Welch's Hill, and Moor Green, Moseley, and at Bournville, for the King's Norton Rural Sanitary Authority. Mr. Robert, Godfrey, C.E., 23, Valentine-road, King's Heath, Birmingham:—

Cruwys & Hobrough, Gloucester £1,056

BRADFORD.—For alterations, &c., to house and shop, Bankfoot, for Mr. H. Mitchell. Mr. Wm. H. Sharp, architect, 237, Kooley-lane, Bradford. Quantities by the architect:—

Revised Tenders.

Masonry.—Ephraim Balmforth, Queensbury	£221 0
Plumbing.—G. Bates, Wibsey, near Bradford	28 18
Plastering.—S. Waddington, Wibsey, near Bradford	21 0
Slating.—S. Slater, Low Moor, Bradford*	12 0

* Old slate to be re-used.

BRENTFORD.—For the erection of potato warehouses, at the market, Kew Bridge, for the Local Board. J. H. Strachan, C.E., Surveyor:—

Perry & Co.	£1,520	Foord & Sons	£1,241
Belham & Co.	1,414	A. Kellett	1,210
J. Barnes	1,260	J. Ball	1,198
F. Benden.....	1,260	J. Broomer, Brentford* ..	1,150

[Surveyor's estimate, £1,250].

* Accepted.

BURNLEY.—For the erection of buildings and chimney, at outfall sewage works, Altham, for the Corporation. Mr. F. S. Sutton, C.E., Borough Surveyor, Town Hall, Burnley. Quantities by the Borough Surveyor:—

Excavating and Masonry.—Craven & Son, Buckburn	£1,630 14 6
Ironfounding.—E. Wood, Manchester	395 0 0
Carpentry and Joinery, — Nuttall & Co. Burnley.....	294 6 11
Slating.—W. Schofield, Burnley	112 7 3
Plumbing and Glazing.—J. Shoesmith, Burnley	99 7 6
Plastering and Painting.—W. Foster & Co., Padiham	52 3 2

BURNLEY.—Accepted for draining, &c., Scott Park-road, for the Corporation. Mr. F. S. Sutton, C.E., Borough Surveyor, Town Hall, Burnley:—

Whitham Sutcliffe, Burnley £456 3 9½

CARDIFF.—For the erection of a mission hall, Grangetown, Cardiff, in connexion with the "Cardiff Forward Movement." Messrs. Habershon & Pawckner, architects, Cardiff, Newport (Mon.), and London. Quantities supplied:—

D. J. Davies	£3,200 0 0	E. K. Evans	£2,834 2 9
J. H. Firbank	2,955 10 0	T. Wood & Son	2,630 0 0
C. C. Dunn	2,950 0 0	S. Shepton & Son ..	2,785 0 0
Geo. Griffiths	2,950 0 0	David Davies	2,778 0 0
W. Best & Co.....	2,905 14 0	Henry Gibbon.....	2,700 0 0
Lattey & Co.	2,805 0 0	Geo. Kuter	2,647 0 0
Hatherley & Carr ..	2,853 0 0	E. Turner & Sons ..	2,630 0 0
E. Trotman	2,837 15 7	Henry Davies	2,579 0 0
A. J. Howell & Co.	2,830 0 0	Knox & Wells*	2,508 0 0

* Accepted.

HALIFAX.—Accepted for paving Holly-grove and Warley-street, Parkinson-lane:—

Thomas Kitchen, Westgate, Halifax..... 3s. 9d. per yard.

HALSTEAD (Essex).—For the erection of isolation hospital, cottage, &c., for the Local Board. Messrs. Goodey & Cressall, architects, 2, Victoria-chambers, West Stockwell-street, Colchester:—

G. Dobson.....£1,748	0 0	F. Dupont.....	£1,595 0 0
Girling & Coe	1,747 0 0	E. West	1 555 0 0
C. E. Orteur.....	1,720 0 0	Pudney & Son.....	1,490 0 0
W. Ripper.....	1 711 6 11	H. Rumbelles	1,484 0 0
G. Sharp	1,699 0 0		

HALSTEAD (Essex).—For the erection of a post office. Messrs. Goodey & Cressall, architects:—

C. E. Orteur.....	£1,368	Mason.....	£1,240
G. Dobson.....	1,360	H. Rumbelles	1,2 5
F. Dupont.....	1,325	G. Pudney.....	1,179

LONDON.—For the execution of engineering works consisting of steam and condense mains, hot-water supply, warming apparatus, &c., at the Western Hospital, Seagrave-road, Fulham, for the Metropolitan Asylums Board. Messrs. A. & C. Harston, Architects, 15, Leadenhall-street, E.C.:—

Matthews & Yates, Ltd.	£5,312 12	Easton & Anderson, Ltd.	£3,965 0
J. Fraser & Son.....	4,971 10	J. & F. May	3,945 0
Clements, Jeakes, & Co.	4,500 0	Strode & Co.	3,793 0
Kite & Co.	4,395 0	Brown, Kearley & Co.	3,700 0
Burn Bros.	4,359 0	Sugg & Co., Ltd.....	3,625 0
J. C. Christie.....	4,137 0	J. C. & J. S. Ellis, Ltd., Shemeld (accepted)...	3,340 0
J. F. Clarke & Son	4,099 0		
Purcell & Nobbs	3,982 0		

LONDON.—For alterations, &c., to 179 and 181, Holland-road, W., for Major-General H. S. Stephens. Messrs. Beeston & Burmester, architects, 30, Lincoln's Inn Fields, W.C.:—

H. Bodeen.....	£264 17	John H. Newman*	£248 0
C. Horton	257 0		

* Accepted.

LONDON.—For the erection of premises on the site of 20 and 22, Hanbury-street, Spitalfields, E, and buildings in rear. Mr. Alfred Condor, architect, Palace-chambers, Westminster. Quantities by Mr. Edward J. Paine, 11, Great James-street, W.C.:—

James Chapman	£2,679	H. L. Holloway	£2,339
J. Chessum & Sons	2,547	Simpson & Co.	2,334
Thomas Knight	2,545	John Greenwood.....	2 263
McCormick & Sons	2,400	Geo. F. Brady (accepted)	2,200

LONDON.—For the execution of sanitary and decorative work at 101, Earl's Court-road, Kensington. Messrs. Morley & Letts, surveyors, 185, Earl's Court-road, S.W.:—

J. Rugg.....	£340	Hancock & Son, 49, Marloes-road, Kensington (accepted)	£249
J. Whitaker.....	291		
Edwards & Son.....	200		

LONDON.—For shop fittings, &c, at 12, Lower Belgrave-street, S.W. Messrs. Morley & Letts, surveyors:—

W. J. Smith	£247 0	T. F. Williams, 30, Moreton-place*	£189 10
J. Whitaker	229 0		
Drew & Cadman.....	193 0		

* Accepted.

LONDON.—For the execution of sanitary work, &c., at 27, Belsize Park, Hampstead, N.W. Messrs. Morley & Letts, surveyors:—

J. Whitaker	£449	J. Myring & Co., 67 and 69, Abbey-road, N.W. *.....	£395
Gregory & Bence	427		
H. Head	410		

* Accepted.

LONDON.—For the erection of a block of warehouses, High-street, Stratford, for Messrs. A. T. Morse & Co. Messrs. J. T. Newman & Jacques, architects, 2, Fen-court, London, E.C.:—

J. H. Newman	£5,546	S. J. Scott	£4,675
White & Son	5,186	B. E. Nightingale	4,669
J. Catley	5,150	Kirk & Randall	4,649
T. H. Craig	4,999	Reed & Son	4,640
Sabey & Son	4,900	F. & H. F. Higgs	4,632
Howlett & Co.	4,890	S. & W. Pattison	4,538
Calnan & Co.	4,830	W. Fortescue	4,498
Hearle & Farrow	4,800	G. Sharpe	4,445
Bishop & Webb	4,790	Gregar & Son	4,444
F. J. Coxhead	4,770	Batdey, Sons,'& Holness*	4,439
W. J. Maddison	4,747		

* Accepted.

LONDON.—For alterations to "Lordings," 154, Denmark-hill, Camberwell, S.E., for Mr. Charles D. Tustin. Mr. Percy H. Clarke, surveyor, 2, Lancaster-place, Strand, W.C.:—

Geo. Parker	£1,812	I. Parsons	£1,567
R. & E. Evans	1,721	Balaam Bros, Hatcham*	1,489
Burman & Sons	1,624		

* Accepted.

LONDON.—For additions to the "Anchor Brewery," Horsley-down, for Messrs. Courage & Co., Limited. Messrs. Inskipp & Mackenzie, architects. Quantities by Messrs. R. L. Curtis & Sons:—

B. E. Nightingale	£17,850	E. Lawrence & Sons	£16,500
Munday & Sons	17,479	Howell J. Williams	15,987
Kirk & Randall	17,000	Wm. Watson	15,524

LONDON.—For alterations to the "Windmill" public-house, Upper Ground-street, Blackfriars, S.E., for Messrs. Barclay, Perkins, & Co. Messrs. Waring & Nicholson, architects, 55, Parliament-street, Westminster, S.W.:—

Sabey & Son	£1,097	T. Lapthorne & Co.	£853
J. Marsland	985	J. F. Ford*	825
Wm. Smith	869		

* Accepted.

MERTHYR TYDFIL.—For extensions to school buildings, Tirphil, for the School Board of Gelligaer. Mr. John Williams, architect, Morgantown, Merthyr Tydfil:—

W. Williams & Son	£1,332
Thomas Williams, Bargoed, *via* Cardiff (accepted)	1,050

NEW TREDEGAR (Mon.).—Accepted for the erection of a mission-room, Elliotown. Messrs. Aaron Davies & Son, architects, Pontlottyn:—

W. Williams & Son, New Tredegar	£599

SOUTHBOROUGH.—For the erection of an isolation hospital, Vauxhall-lane, for the Local Board. Mr. William Harmer, architect, 137, London-road, Southborough:—

Longley & Co.	£2,978 0 0	E. Punnett, Tonbridge*	£2,668 0 0
J. Jarvis	2,843 0 0	A. & W. Porter	2,359 0 0
Strange & Son	2,776 0 0	Seale & Austin, Tonbridge†	111 6 6
Langridge	2,770 0 0		
F. Avard	2,727 0 0		
Davis & Geaney	2,692 5 0		

*Accepted.
† Accepted for water main only.

SOWERBY BRIDGE (Yorks.).—For excavating, draining, paving, &c., Wallis-street and part of Industrial-road, for the Local Board. Mr. Fred B. Rothera, Surveyor, Town-buildings, Sowerby Bridge. Quantities by the Surveyor:—

Wallis-street.

John Cockroft	£472 17 9½	William Sutcliffe, Sowerby Bridge*	£320 0 0
John Balmforth	405 0 0	W. Hooson	267 2 9
Thomas Kitchen	348 8 1½		
James Bateman	332 1 0		

* Accepted.

Industrial-road (part of).

J. Balmforth	£262 10 0	W. Sutcliffe, Sowerby Bridge (accepted)	£214 0 0
J. Kitchen	237 0 5½	J. Cockroft	206 2 11
W. Hooson	236 9 8		
J. Bateman	233 0 0		

WORTHING.—For the erection of furniture depositories for Messrs. Durtnall & Co. Mr. Arthur Loader, architect, 54, Old Steine, Brighton. Quantities by the architect:—

J. G. King	£5,219 6 4	E. C. Patching	£4,900 0 0
G. R. Lockyer	5,217 0 0	W. Taylor	4,890 0 0
Patching & Son	5,196 0 0	V. P. Freeman	4,860 0 0
W. Stanbridge & Co.	5,050 0 0	J. Blaker	4,790 0 0
J. J. G. Saunders & Sons	4,924 0 0	W. A. Field & Co.	4,748 10 0
		J. Barnes	4,723 0 0

TO CORRESPONDENTS.

W. F. L. (our correspondent already has the information he requires); W. S. B. (amounts should have been stated); J. H. W. (ditto); J. L. (ditto); H. C. C. (below our limit); P. O'N. (ditto).

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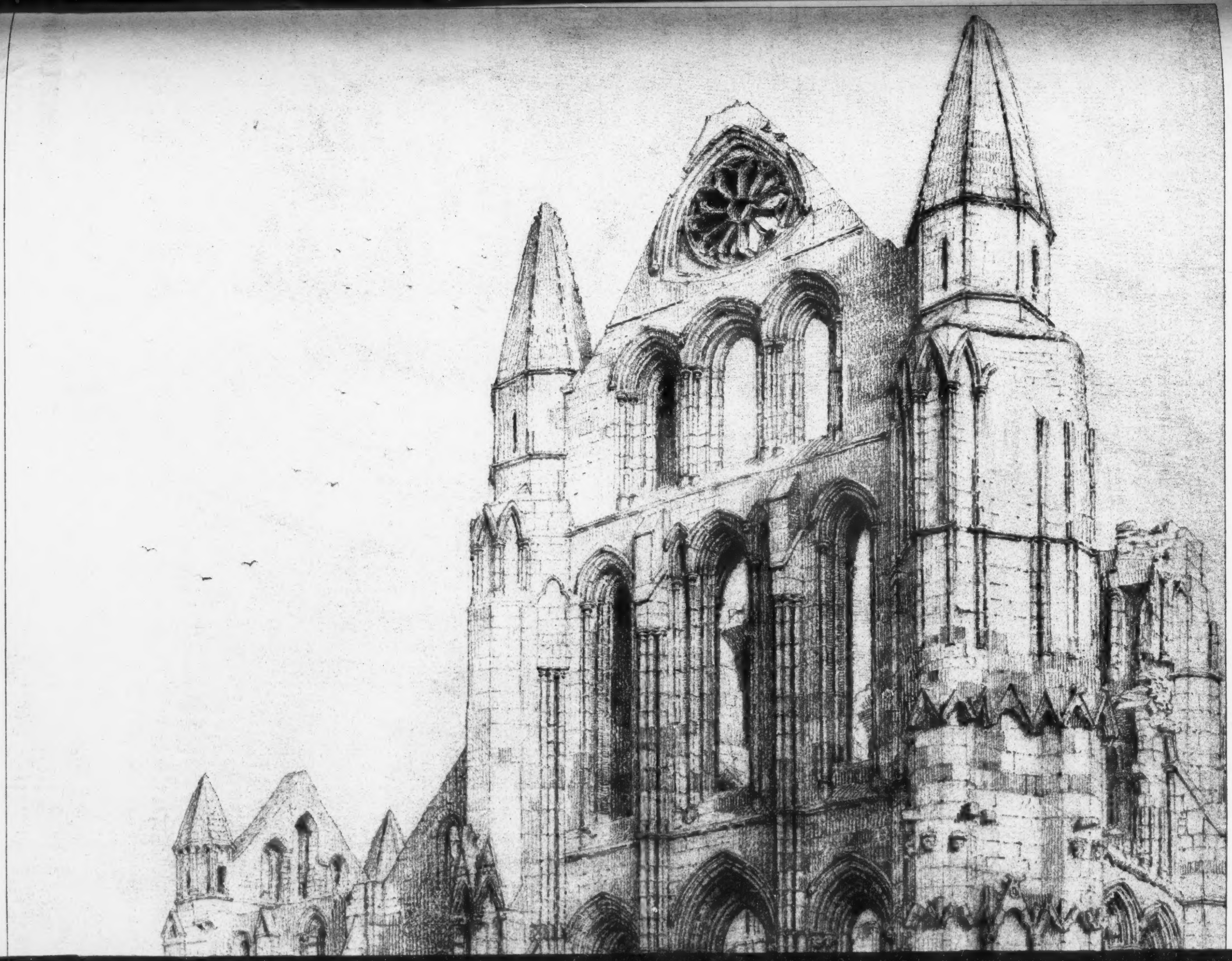

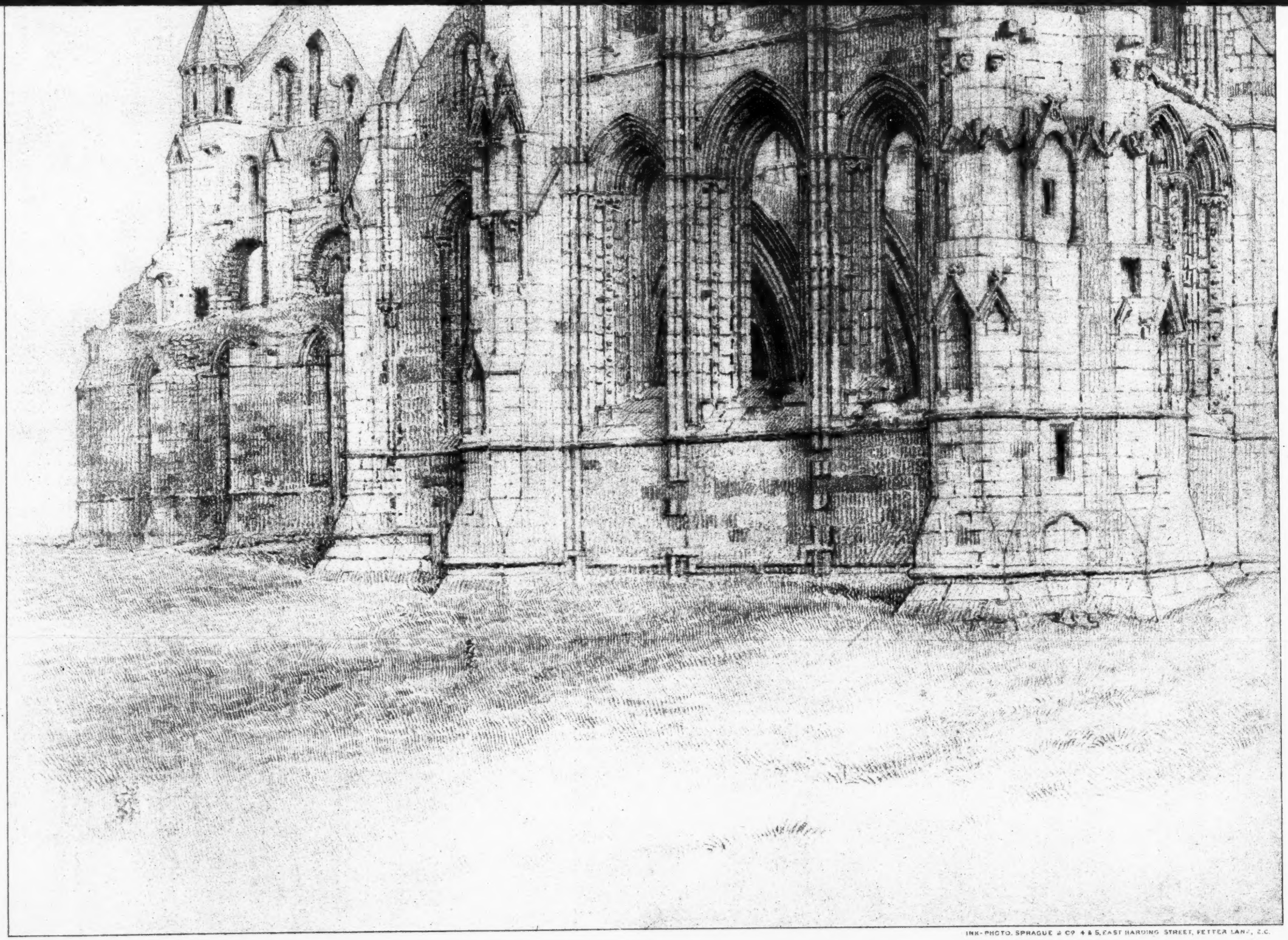

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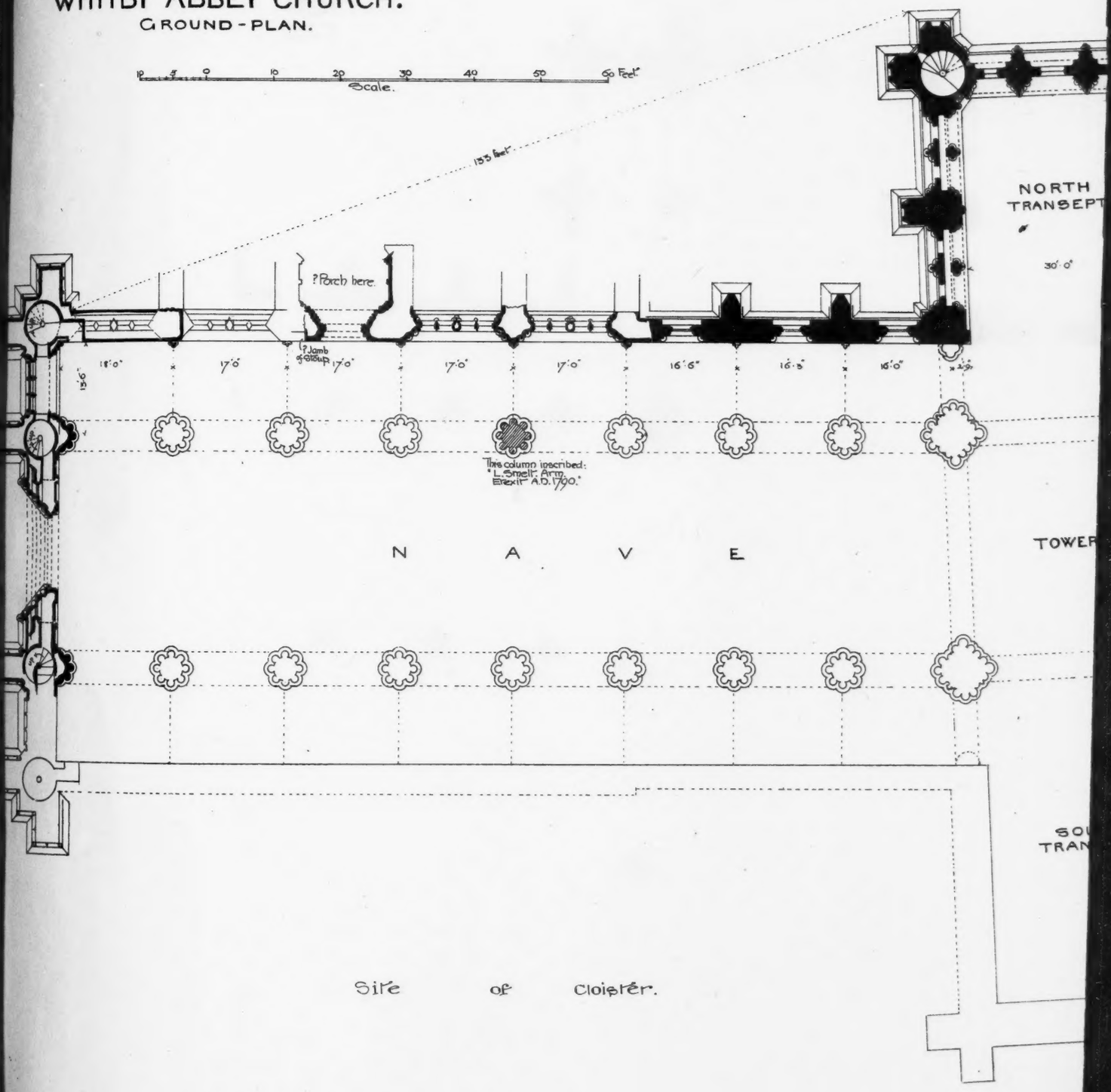

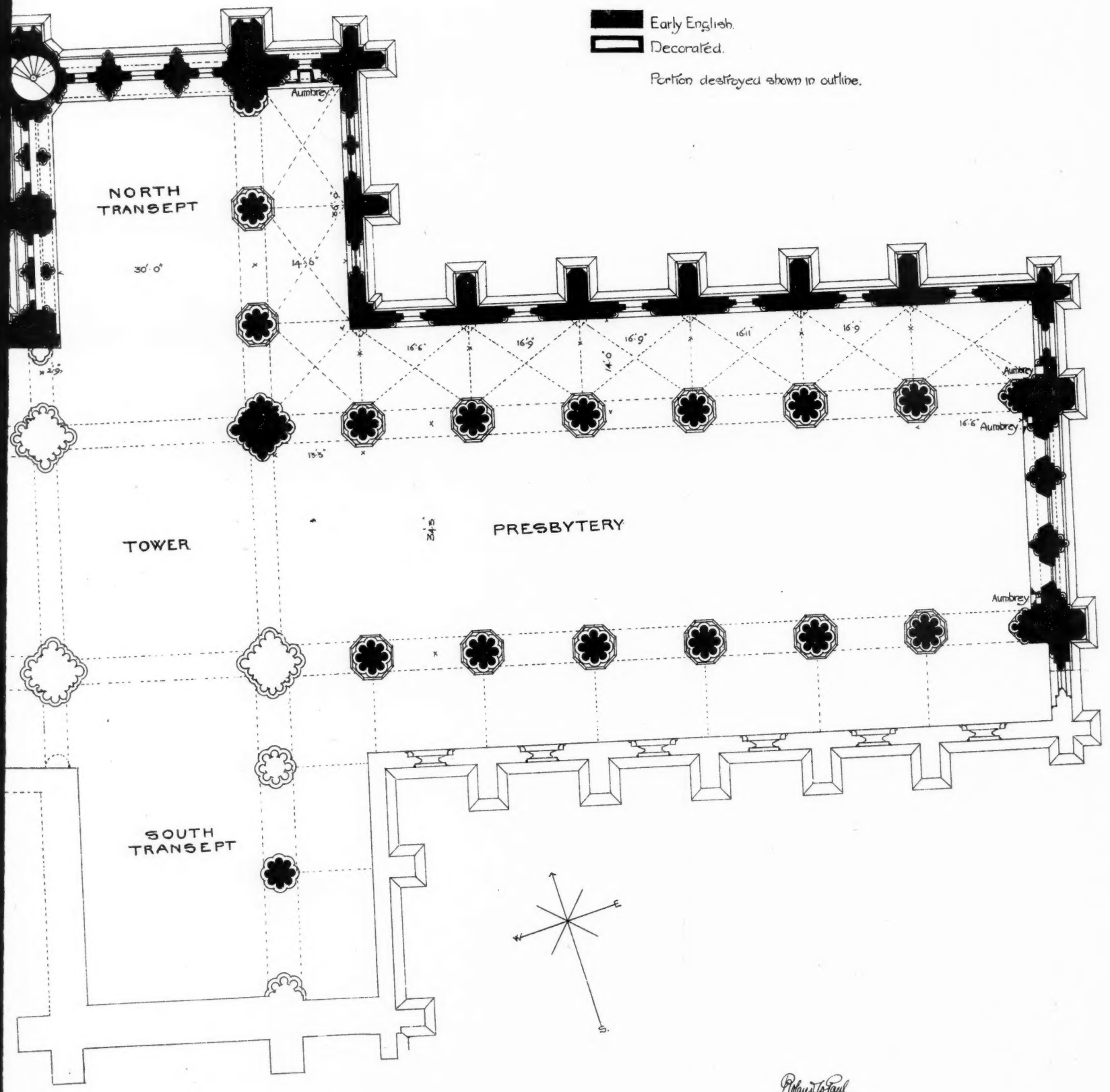

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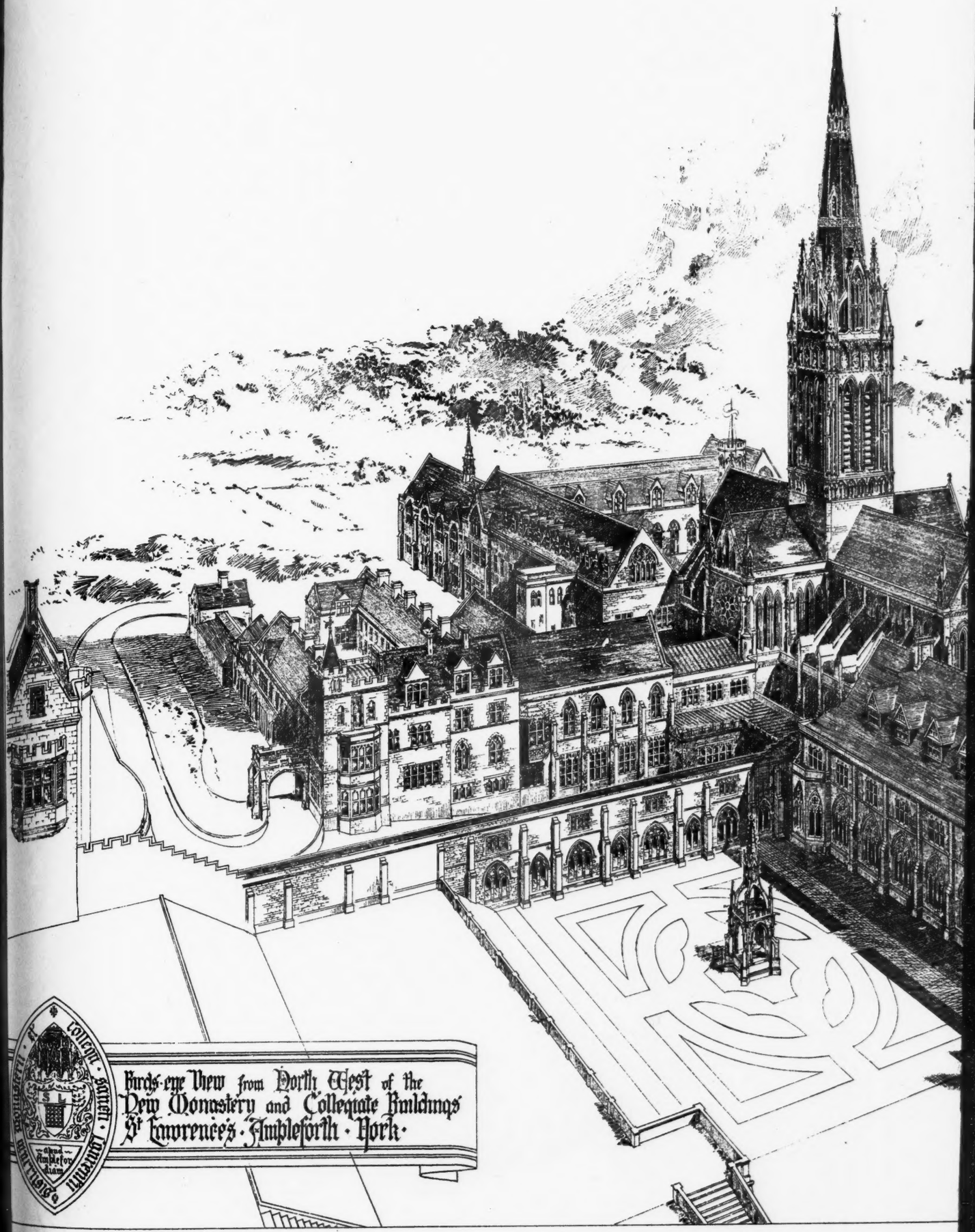

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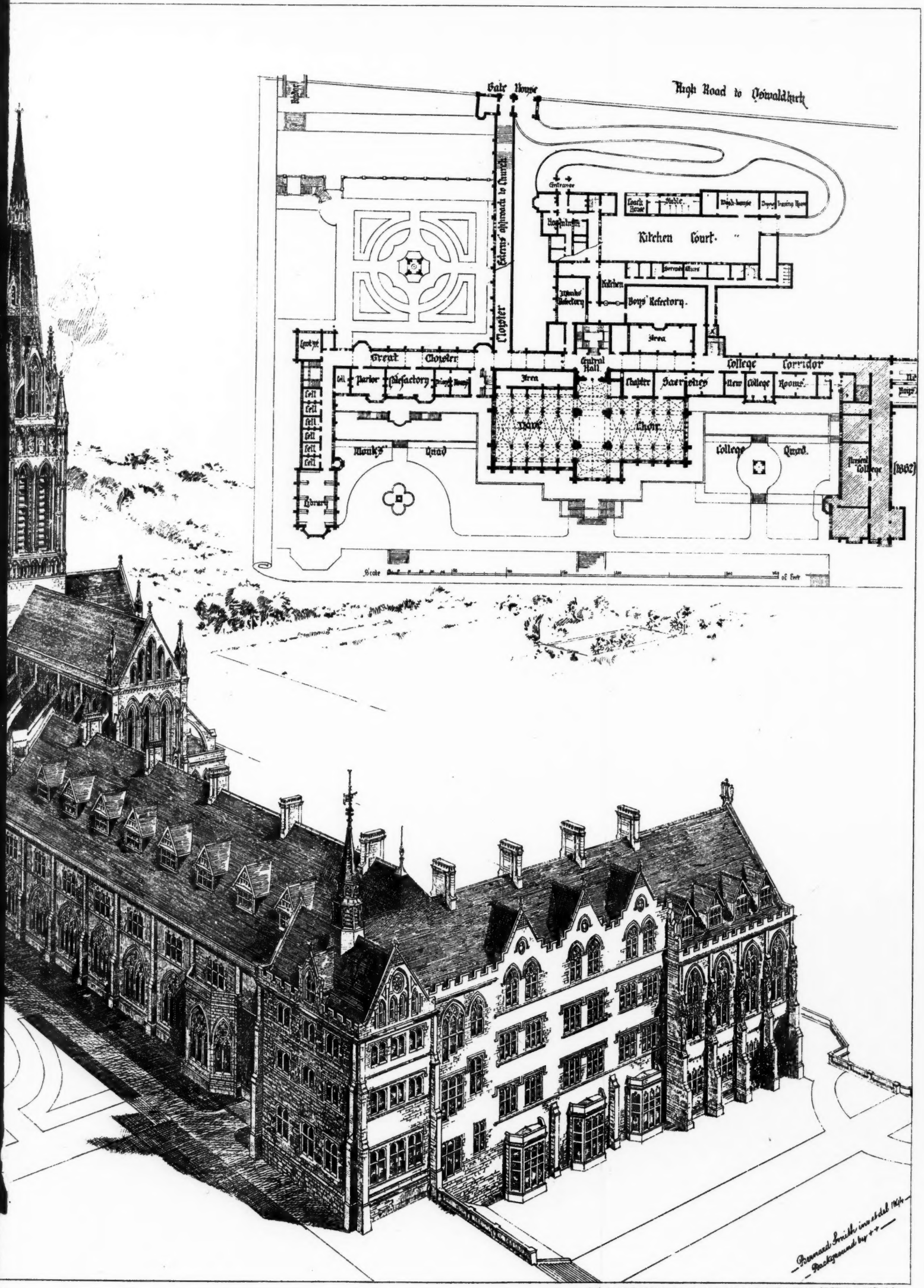
Royal Academy Exhibition, 1894.



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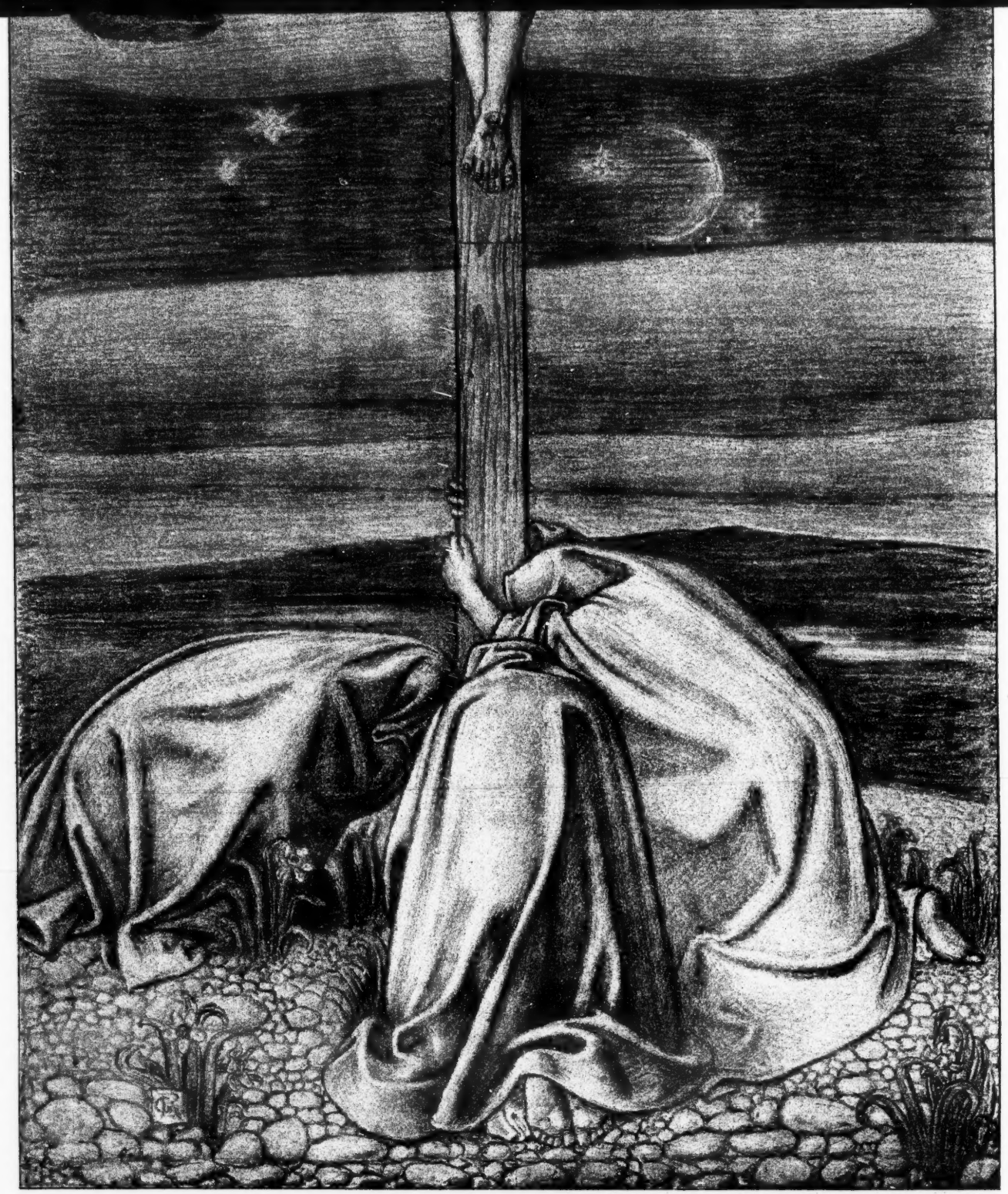

INK-PHOTO. SPRAGUE & Co 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

CARTOON FOR ALTAR-PIECE.—By Mr. G Woolliscroft Rhead.

Royal Academy Exhibition, 1894.